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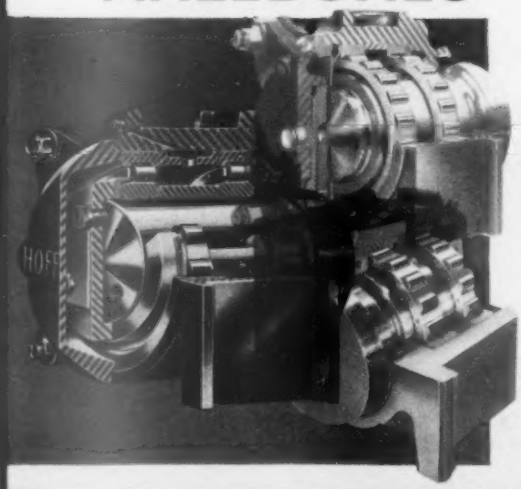

HOFFMANN AXLEBOXES for main line diesel and electric locomotives
★ The Brush Type 2 AIA-AIA 1250-1365-1600 h.p. Diesel Electric Locomotives for British Railways.

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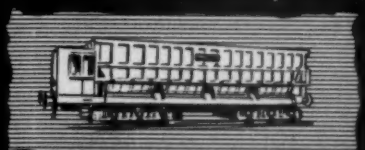

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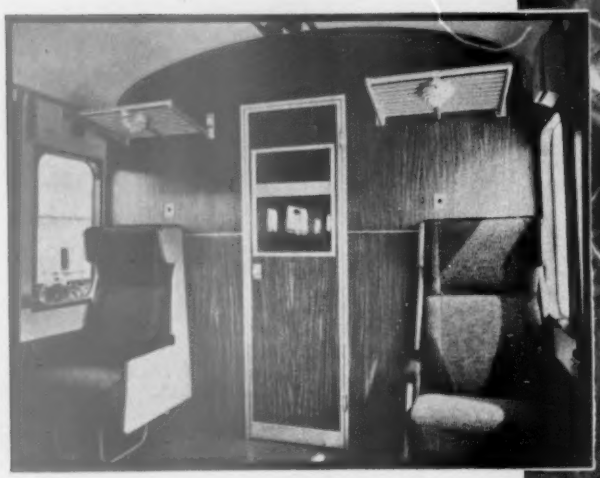
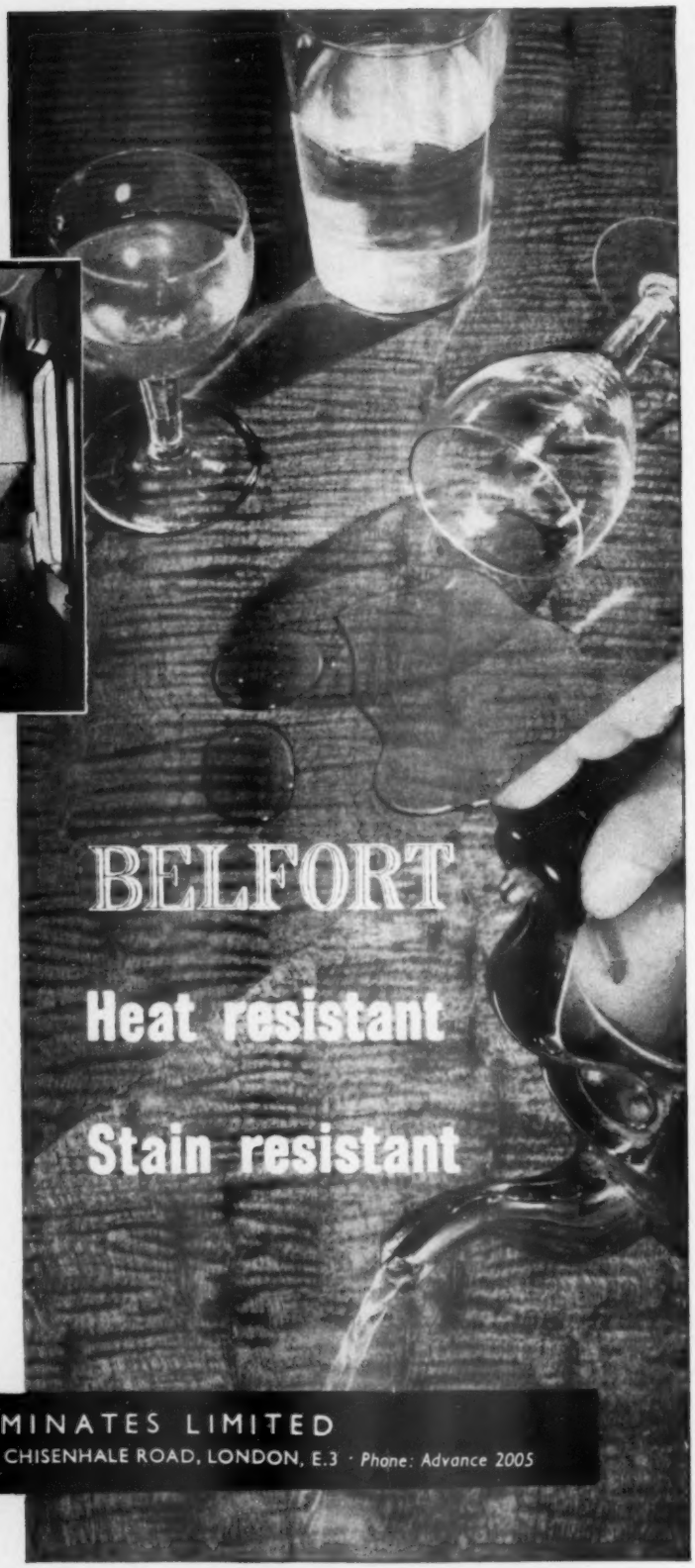


Belfort Afrormosia used for panelling in the new Railway Coaches. Photograph reproduced by permission of London Midland Region, British Railways.



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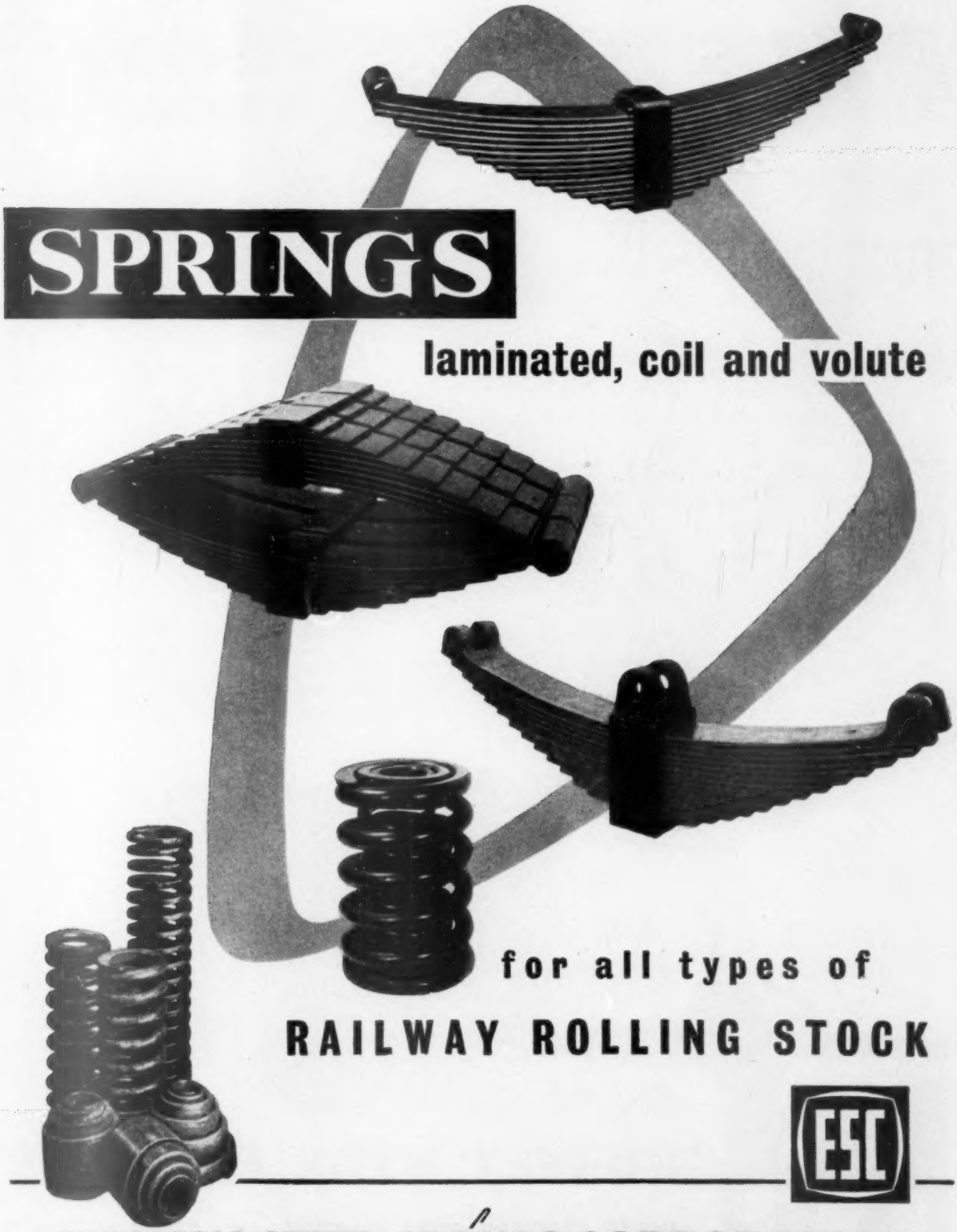

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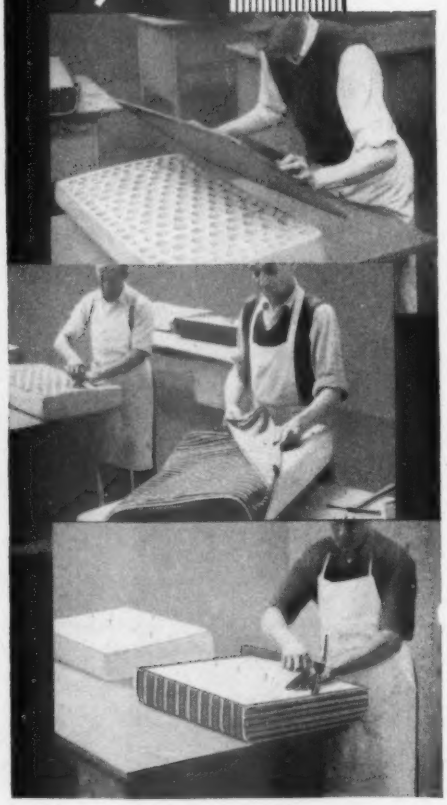

Just three simple operations! One-piece cushion shape is cemented to base-board (1), made-up cover is fitted over (2), edges are tacked down (3).

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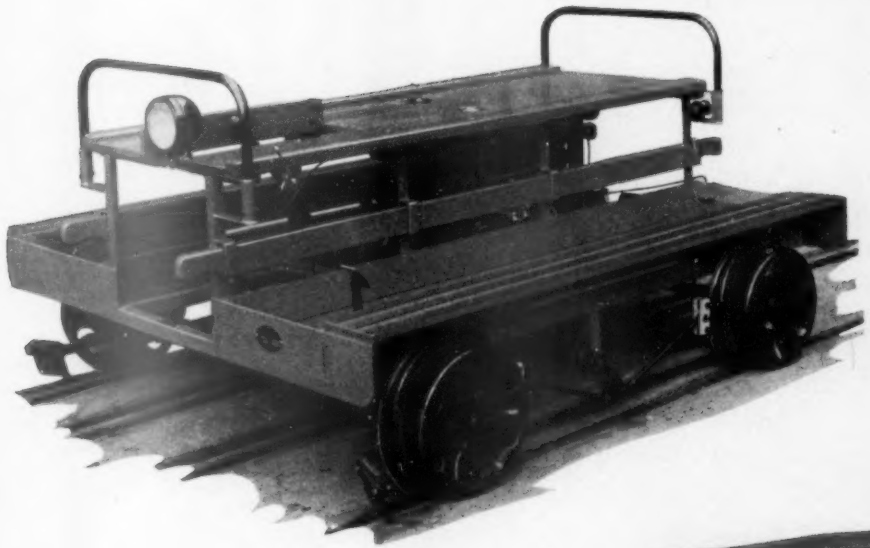

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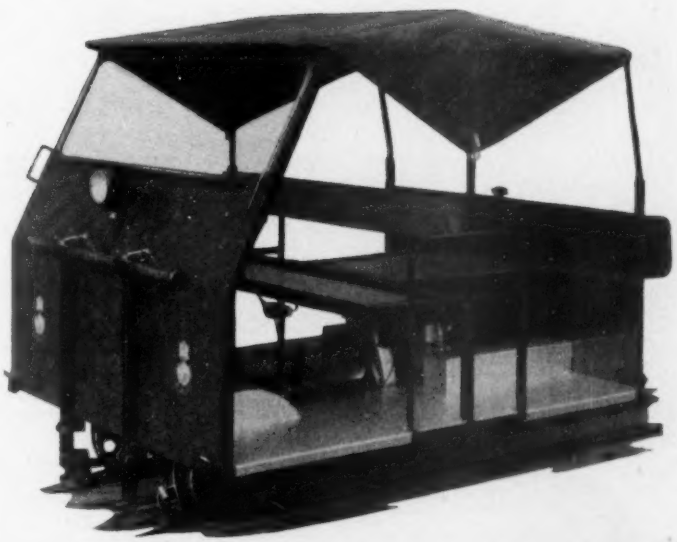

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Everybody gains

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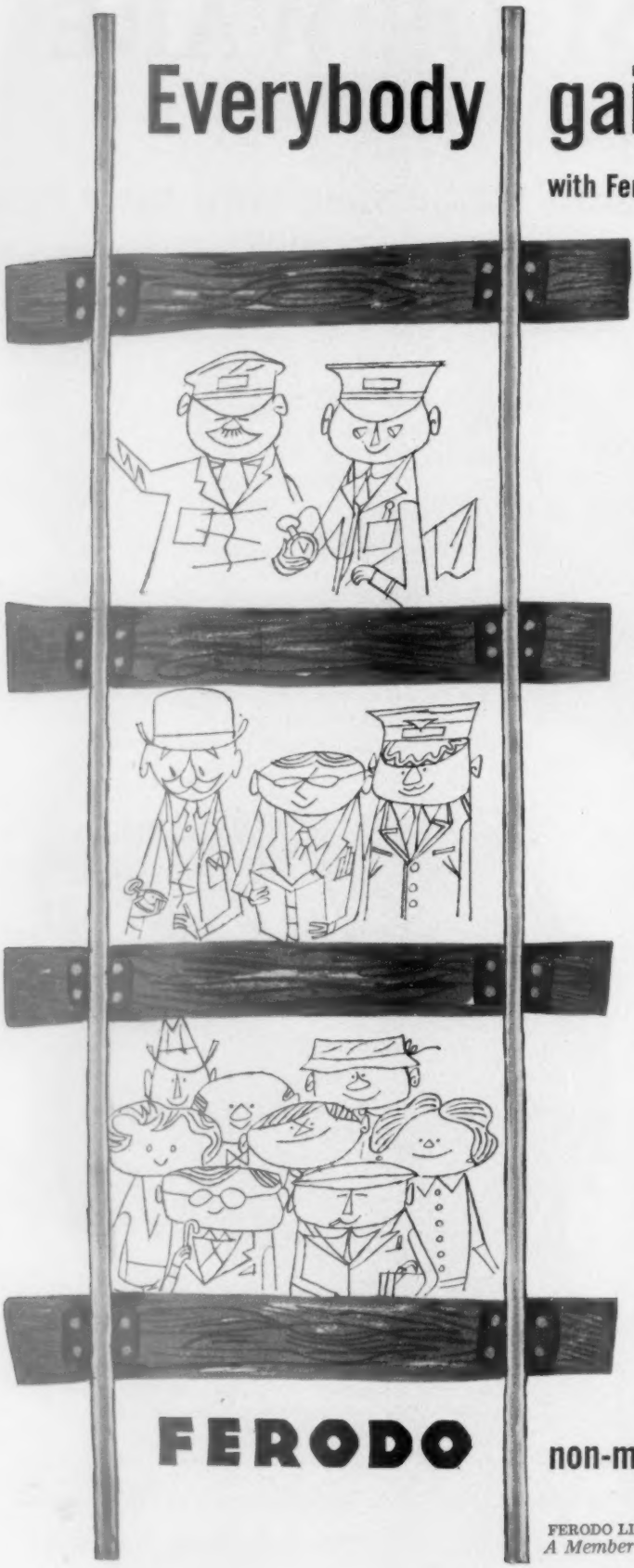

THE TRAIN CREW find that Ferodo non-metallic brake blocks reduce overall braking distances and dramatically improve train control at high speeds. High-speed brake application creates high temperatures: where cast-iron blocks soften and fuse, Ferodo non-metallic blocks act with full effect.

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In fact, Ferodo non-metallic brake blocks give better braking at less cost!

FERODO non-metallic brake blocks

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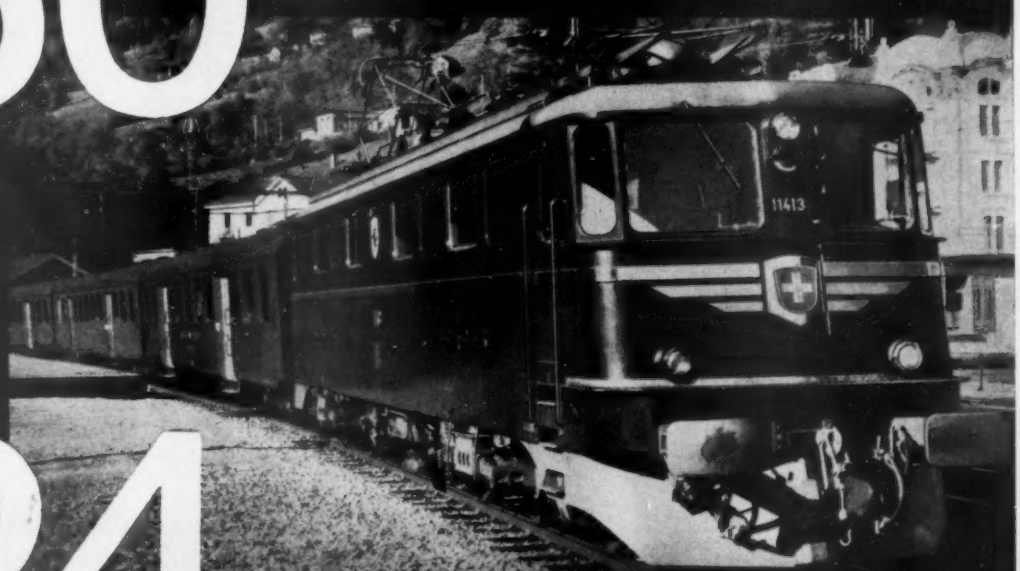
SLM

90 years experience in design and manufacture of locomotives and railcars!

50

of these 6000 HP Co-Co type locomotives are giving excellent service on the Gothard and the Simplon lines of the Swiss Federal Railways.

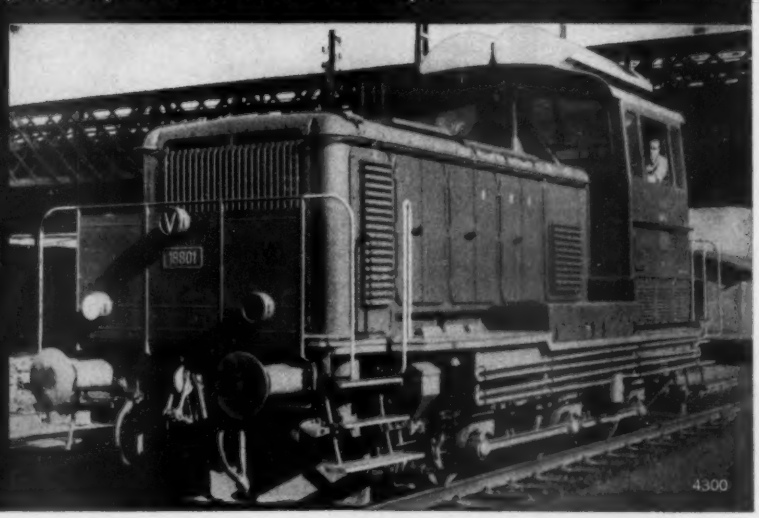


24

To meet traction requirements due to increasing traffic 24 more of these powerful and reliable engines have been ordered lately.

35

A further contract for the supply of 35 Diesel-electric locomotives, 600 HP each, fitted with SLM traction Diesel engines has also been placed by the Swiss Federal Railways.



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Locomotive and Machine Works
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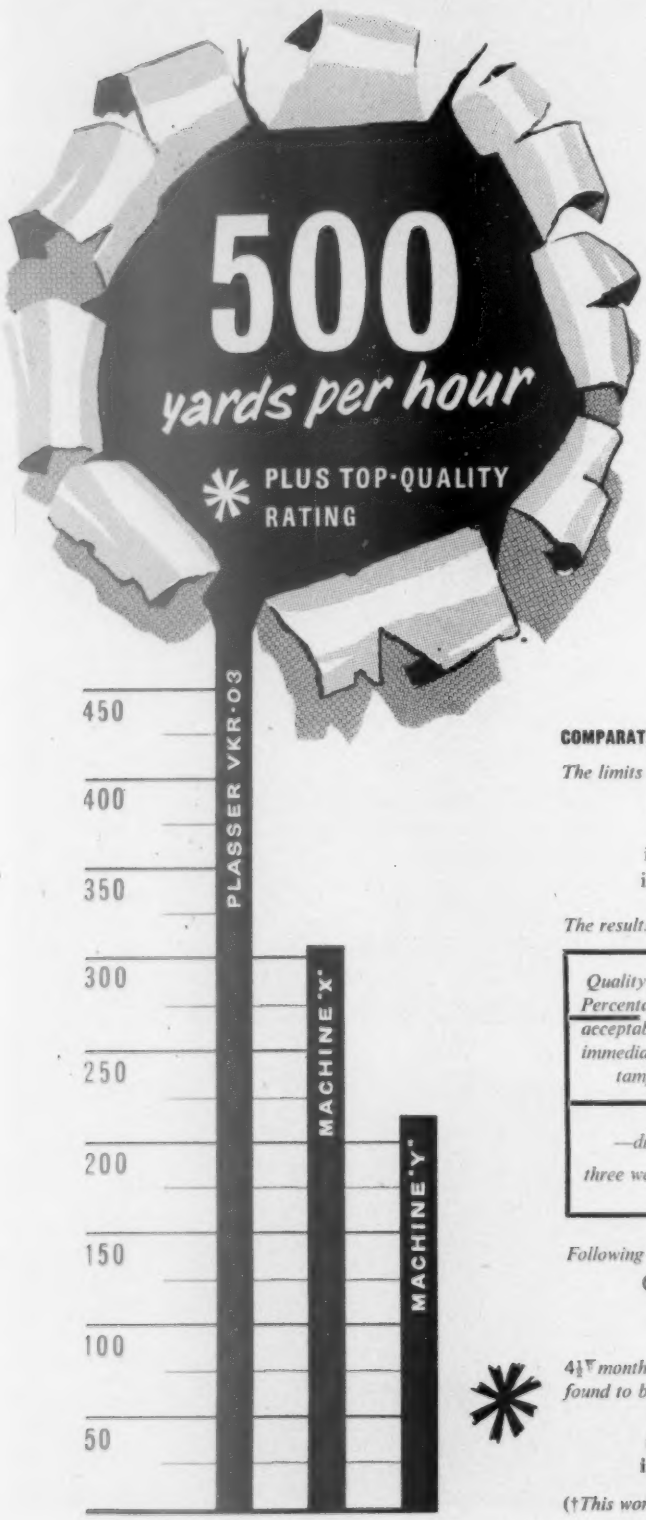
outstanding achievement!



Remarkable results from Board of Trade Test carried out last May on three different manufacturers' normal production models on-track tamping machines. The results proved conclusively that the PLASSER VKR-03 is far superior to its competitors, both in speed and quality of work.

The test was carried out on a Class ' A ' track, average speed 75/80 m.p.h. 95 lb. B.H. material, 60′ rails, timber sleepers, on a compounded curve 62-85 chains radius, having cants of 3″ and 2″ respectively.

COMPARATIVE TESTS OF ON-TRACK BALLAST TAMPING MACHINES

The limits laid down were as follows:

i. For longitudinal level—Rate of change not to exceed $\frac{3}{16}$″ in 15′ 0″.
ii. For cross level—Variation not to exceed $\pm\frac{1}{8}$″.
iii. For voids—Not to exceed $\frac{1}{8}$″.

The results obtained were:

		Machine 'X'	*Machine 'Y'*	*PLASSER VKR-03*
Quality of work Percentage inside *acceptable limits, immediately after tamping.*	*Longl. Level*	77½	77	91
	Cross Level	28	59	77
	Voids	92	93	98
—ditto— three weeks later	*Longl. Level*	78	77	93
	Cross Level	8	41	45
	Voids	95	87½	98

Following the second set of measurements it was found:

(1) **The cross level errors** *outside* **the acceptable limits on the Plasser length were reasonably constant and of the order of** $\frac{3}{16}$″ **to** $\frac{1}{4}$″.

4½ months after the trials the following measured shovel packing was found to be necessary:

i. **Machine ' X ' 95% of the test length was re-worked.**
ii. **Machine ' Y ' 83% of the test length was re-worked.**
iii. **PLASSER VKR-03 6% of the test length was re-worked.†**

(†*This work was not necessary until two weeks before this report!*)

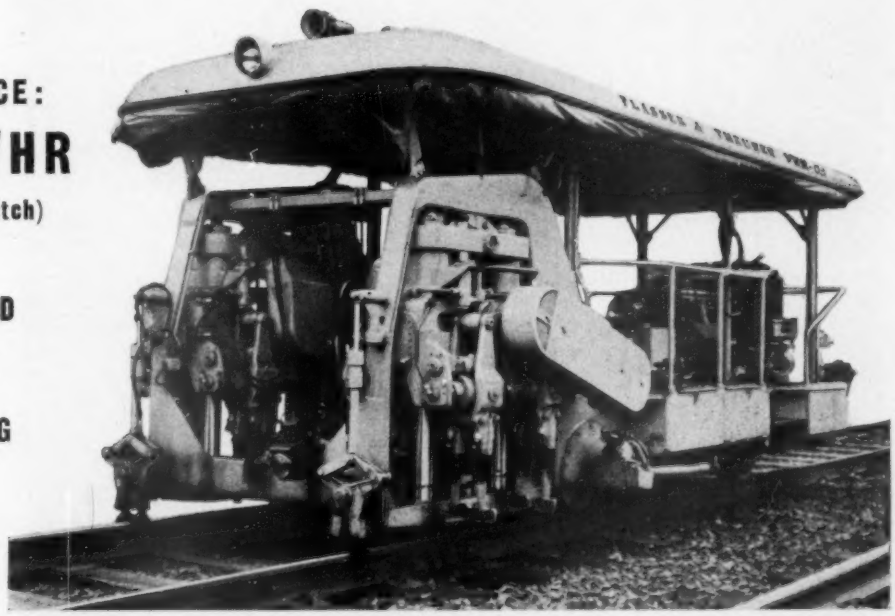
. . . for the PLASSER VKR-03

PEAK PERFORMANCE:

710 YARDS/HR

(According to sleeper pitch)

NON-SYNCHRONISED
FULLY HYDRAULIC
ON-TRACK TAMPING
MACHINE



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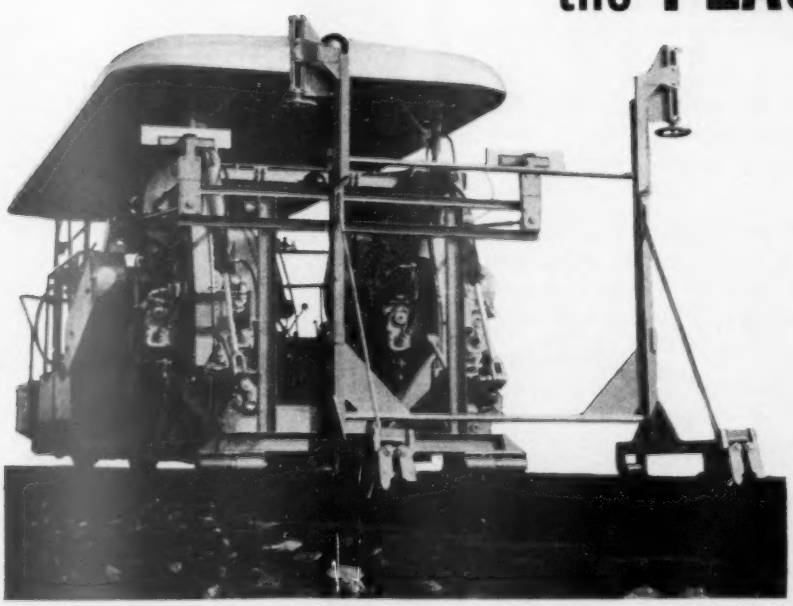
now BRITISH TRANSPORT COMMISSION order 20 of the new model –

the PLASSERMATIC VKR-04



The PLASSERMATIC VKR-04 Model has all the test-winning features of its predecessor but has, for the first time ever, levelling, lifting and tamping operations carried out *all by the same machine!*

For further information on the PLASSER range of Railway Track Maintenance Equipment, please contact:

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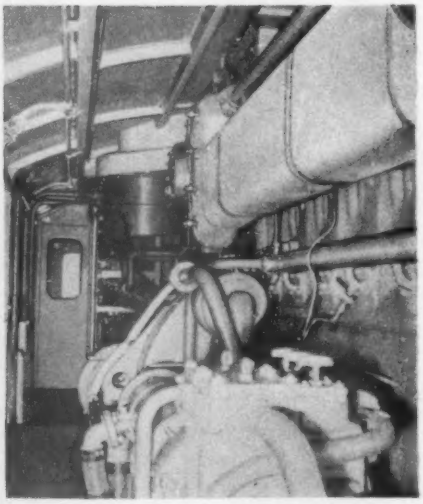
A 450 ton load at 70km/h !

Thailand's narrow railway gauge (1 metre) called for special consideration in the design of 950 H.P. diesel-electric locomotives for her State Railways. Maximum permissible axle load was 12 tons, and the restricted body width entailed a special arrangement of mechanical and other parts.

The hot humid climate under which the locomotives would operate required particular attention to be paid to the cooling system, and to the electrical insulation. Then there were the operator's requirements—450 ton loads at 70 km/h on level runs; 400 tons at 12 km/h on grades of 25 per mil.

Hitachi built them. Hitachi has the know-how, having built one of the world's largest narrow-gauge diesel-electric locomotives (1,900 H.P.) and several 1,400 H.P. units for the Japanese National Railways. 5 units have already been delivered to Thailand and 25 more are being built in Hitachi factories, whose experience will keep them rolling for many years to come.



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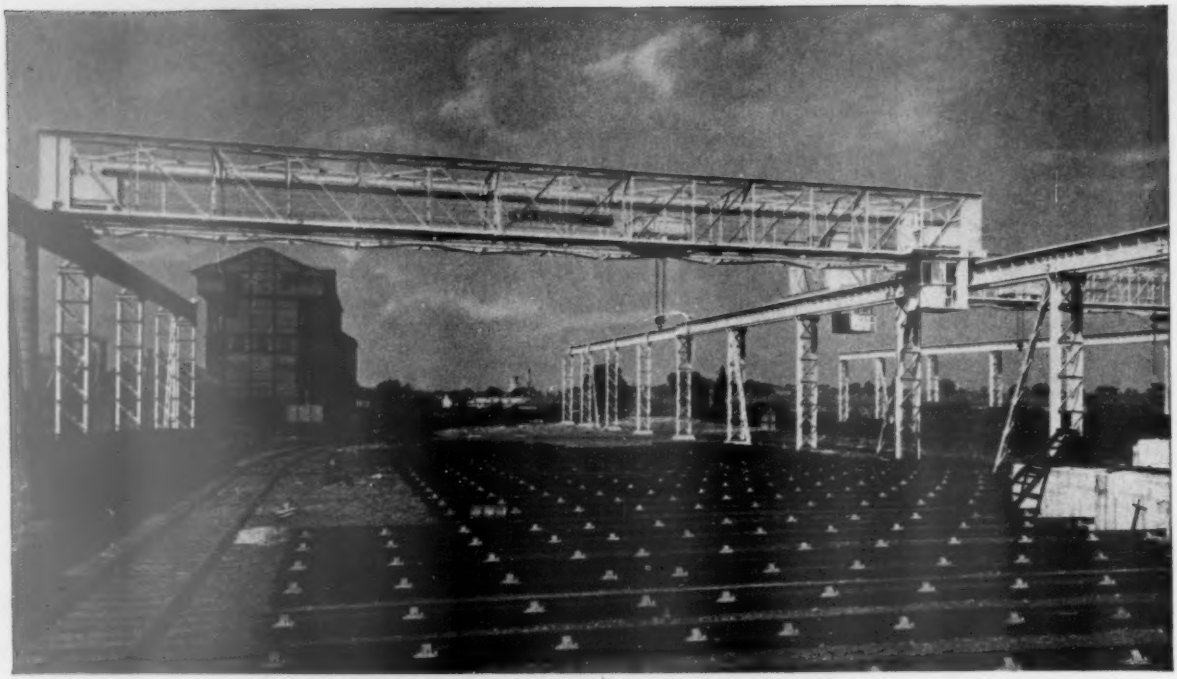

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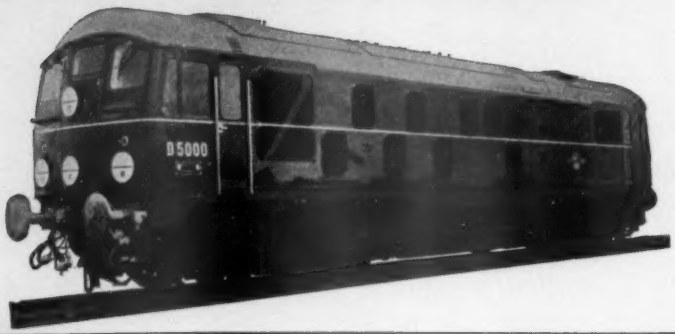
MODERN BRAKE EQUIPMENT

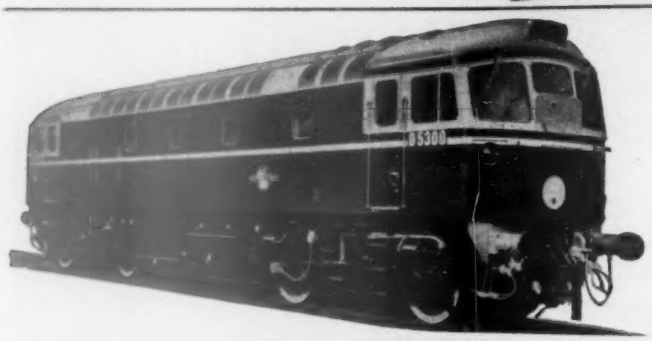
1160 H.P. Type '2' Diesel-Electric Locomotives.

Built by the Derby, Crewe and Darlington works of the B.T.C.

176 of these locomotives are to be supplied with Sulzer Engines and Power Equipment by A.E.I. Traction Division.

Metcalfe-Oerlikon brakes are also fitted.





1160 H.P. Type '2' Diesel-Electric Locomotives.

Built by the Birmingham Railway Company & Wagon Co. Limited.

47 of these locomotives have Sulzer Engines and Crompton Parkinson Power Equipment.

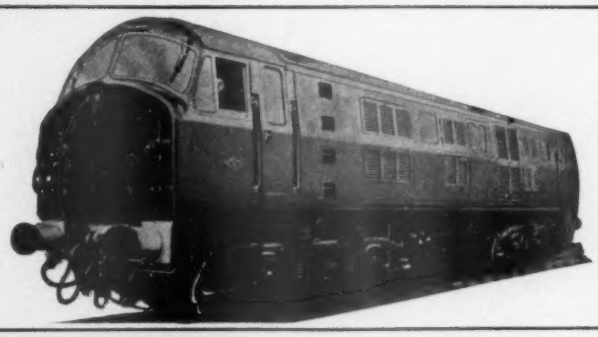
Metcalfe-Oerlikon brakes are also fitted.

1100 H.P. Type '2' Diesel-Electric Locomotives.

Built by the North British Locomotive Company Ltd.

They have N.B.L./M.A.N. Diesel Engines and General Electric Company Power Equipment.

Metcalfe-Oerlikon brakes are also fitted to 38 of these.



The above are just three of the many types of Main Line Diesel-Electric Locomotives now in service with British Railways and all are equipped with 'Metcalfe-Oerlikon' patent Vacuum Controlled Air Brake Equipment.

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Light Weight
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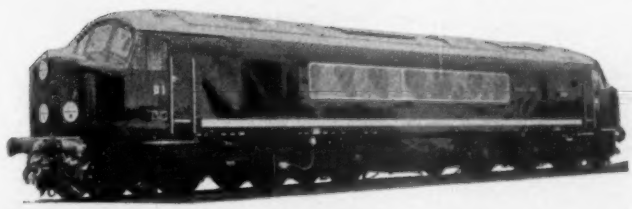
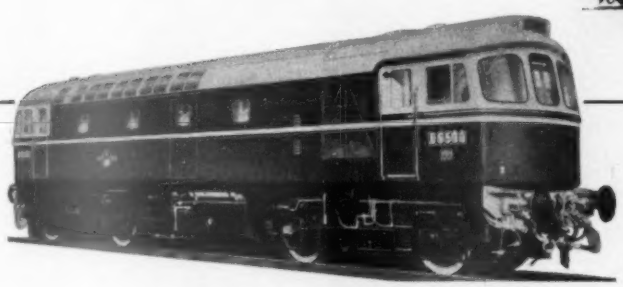
MODERN BRAKE EQUIPMENT

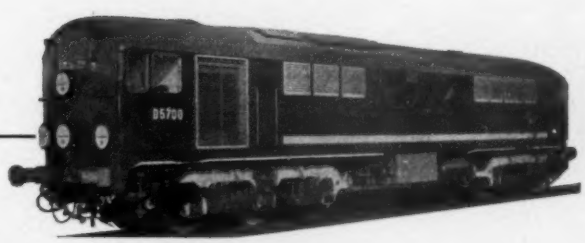
10 – 2300 H.P. Type '4' Diesel-Electric Locomotives. Built by the Derby Works of the B.T.C. and fitted with Sulzer Engines and Crompton Parkinson Electrical Equipment. 10 of these Locomotives are in service with British Railways and a further **137** are now building.





1550 H.P. Type '3' Diesel-Electric Locomotives. Built by the Birmingham Railway Carriage & Wagon Co., Ltd. and fitted with Sulzer Engines and Crompton Parkinson Electrical Equipment. **98** of these Locomotives are to be supplied, and these are arranged for working with either 'Vacuum' or 'Air' braked trains through a single Driver's Brake Valve.

20 – 1200 H.P. Type '2' Diesel-Electric Locomotives. Built by Associated Electrical Industries Ltd. and fitted with Crossley Brothers Ltd. engines. These Locomotives are now in service on British Railways.



52 – 1100 H.P. Type '2' Diesel-Hydraulic Locomotives being built by the North British Locomotive Co., Ltd. with N.B.L./M.A.N. Engines and Voith/North British Hydraulic Transmission.

THE ABOVE LOCOMOTIVES ARE EQUIPPED WITH METCALFE-OERLIKON BRAKE EQUIPMENT

JUST ANOTHER FOUR OF THE MANY TYPES OF MODERN MAIN LINE LOCOMOTIVES NOW IN SERVICE WITH BRITISH RAILWAYS. ALL ARE EQUIPPED WITH METCALFE-OERLIKON MODERN BRAKE EQUIPMENT.

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Designed, primarily for use by private and public telephone operators and approved by the G.P.O., STC Lightweight Headsets are now being widely used for other applications. Authorities and operators concerned with audio monitoring and control have quickly recognized the advantages in comfort and sensitivity provided by this new design.

Wider use for STC *Lightweight Headsets*

The "Rocking Armature" principle which gives improved sensitivity and frequency response—an important STC development in telephone receiver design—has been incorporated into these instruments.

The main advantages of this STC product are: extraordinary light weight, a high degree of comfort, stability and manoeuvrability and constant level of transmission regardless of head movement. Available in black or ivory nylon plastic which is virtually unbreakable.

Write for Brochure D/104

STC Lightweight Head Receiver in use at Broadcasting House. These instruments have been adopted by the B.B.C. for use in their London and provincial studios.

At London Airport, B.E.A. Apron Control have recently reorganised their communication facilities to cater for their 400 air movements a day peak load. The controllers use STC Lightweight transmitter/receiver headsets to assist them with strain-free operation.

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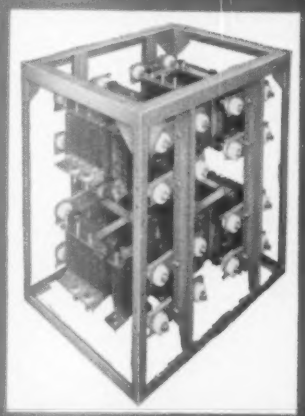
On the right lines—

with FAWCETT RESISTORS ✳

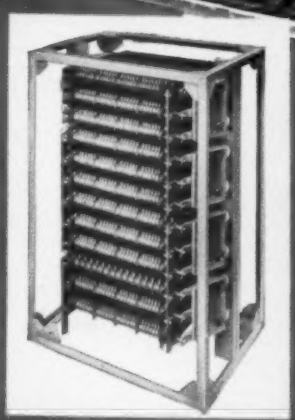
Running between Manchester and Crewe, this British Railways 25 kV, 3,300 h.p. electric locomotive, one of ten supplied by G.E.C., is the first of its type to operate a scheduled passenger service in the British Isles.



FAWCETT F.P. SERVICE RESISTOR installed to carry out two main functions:

a) to act as smoothing resistors and to divert ripple current from the traction motor main field system. Being virtually non-inductive F.P. Service Resistors are ideally suited for this purpose.

b) to divert the field current to permit the speed of the locomotive to be increased at pre-determined stages.



FAWCETT F.P. HI-TEMP STRIP RESISTOR Used for tap-changing on the regulating transformer providing safe operation at high temperature with high overload capacity. Skilled design ensures that of the total weight, one half is of active material. Non-corrodible and unbreakable construction.

✳ FAWCETT F.P. Hi-Temp Strip and F.P. Service Resistors were chosen for these new high-speed locomotives and have proved their ability to provide maximum rating with minimum size and weight and long efficient operation under all conditions.

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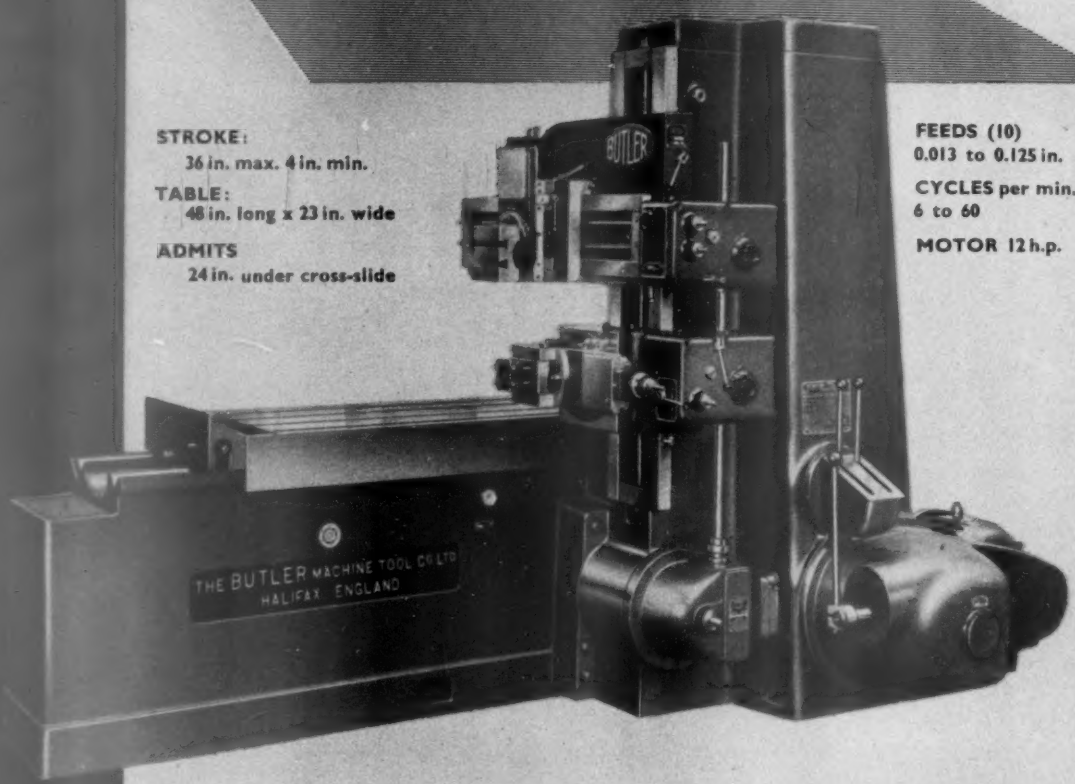

STROKE:
36 in. max. 4 in. min.

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48 in. long x 23 in. wide

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FEEDS (10)
0.013 to 0.125 in.

CYCLES per min.
6 to 60

MOTOR 12 h.p.

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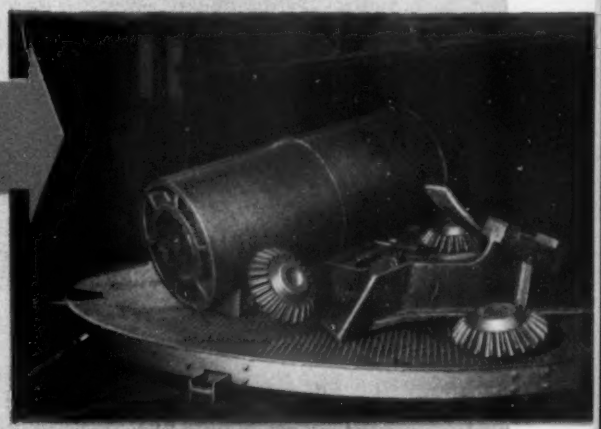

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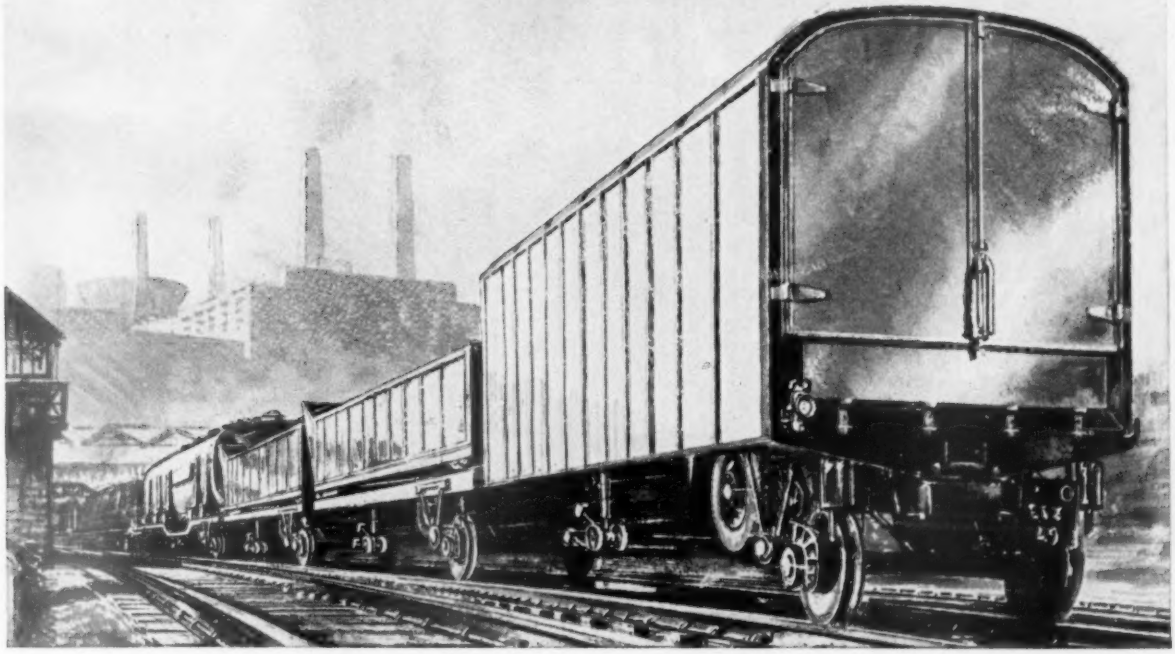
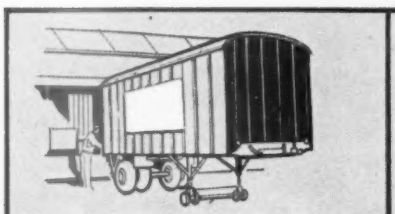
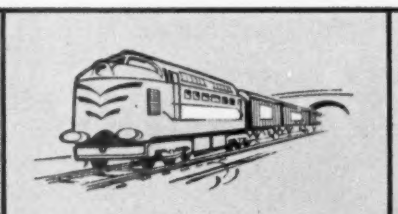


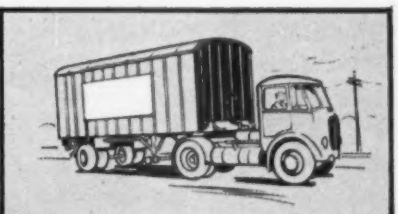
...speed and economy on trunk hauls and door-to-door service too!



1 The Roadrailer, loaded at the factory as an ordinary articulated lorry.



2 The Roadrailer as part of a fast freight train.



3 The Roadrailer converted back to a lorry completes delivery by road.

Now it's an 11-ton lorry, loaded in the usual way and driven by road to the railhead. Only 150 seconds to retract the road wheels and lower the rail wheels and hey presto – now it's part of a fast freight train designed for through travel at an average speed of 60-65 m.p.h.

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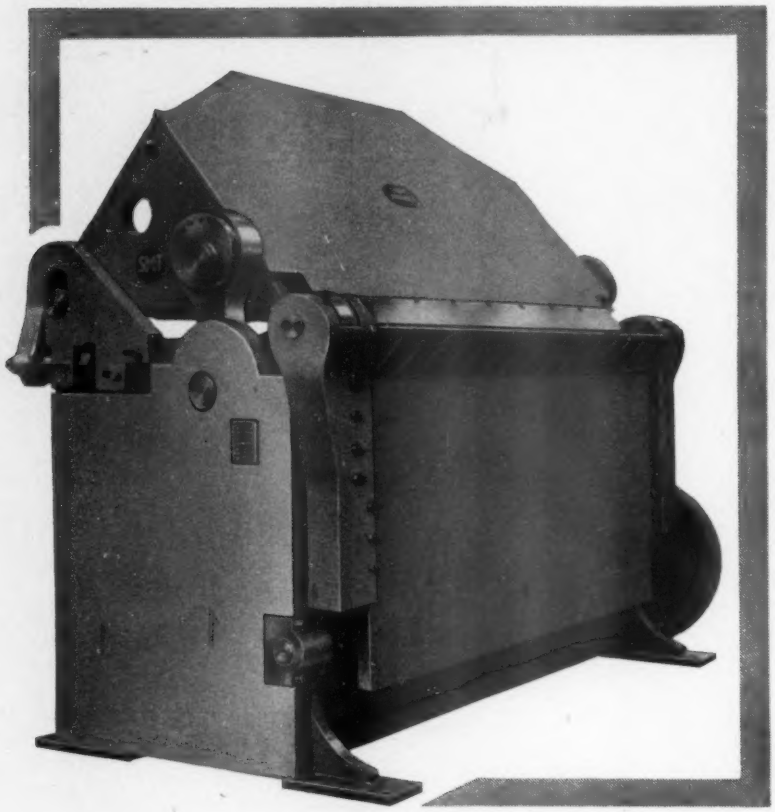

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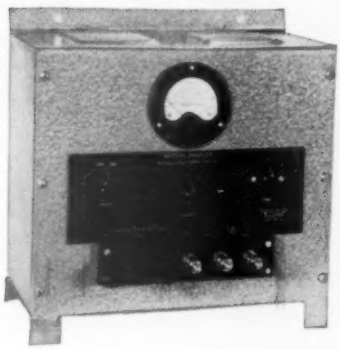

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comprising a transformer of appropriate capacity and windings for the required voltage with tappings to suit line drop, as also for varying the charging current, and including a rectifier, on and off switch, tapping switch and variable resistor (coarse and fine) control.

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TYPE P.9591/1: 110V A.C. for 3 LA cells charging at .025/1A
Case size: 8¼″ x 5¼″ x 4½″
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TYPICAL CHARGING UNITS/Input 200, 230, 250V A.C., 50 c/s
Charging 1 LA cell, max. current 1 amp., min. 50mA
„ 2 or 3 LA cells, max. current 1 amp., min. 25 mA
„ 6 LA cells, max. current 3, 5 or 8 amp, min. 50 or 1.75 mA
„ 8, 12, 16 or 20 LA cells, max. current 3 amp., min. 50 mA
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Case size: 8¼″ x 5¼″ x 4½″.
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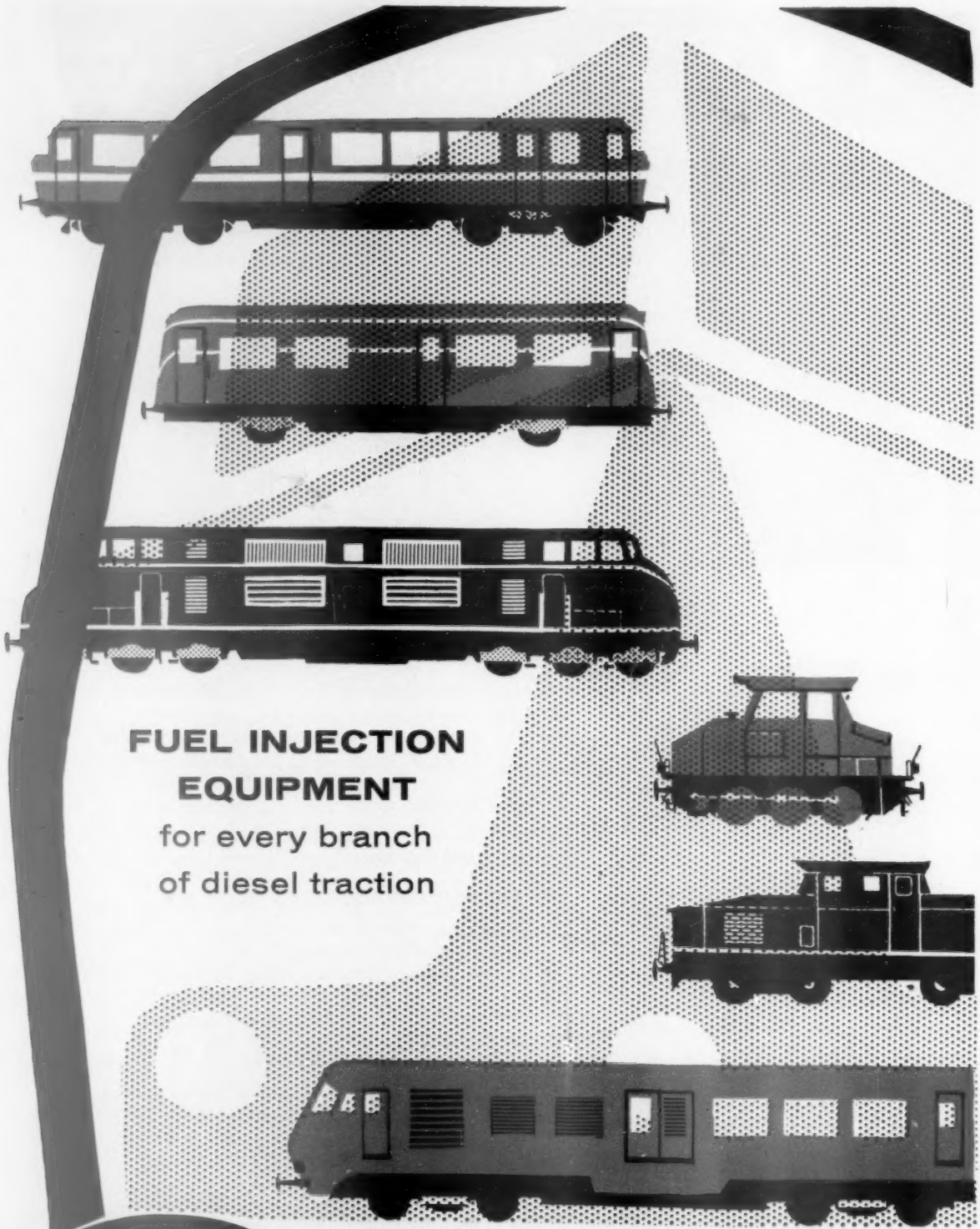

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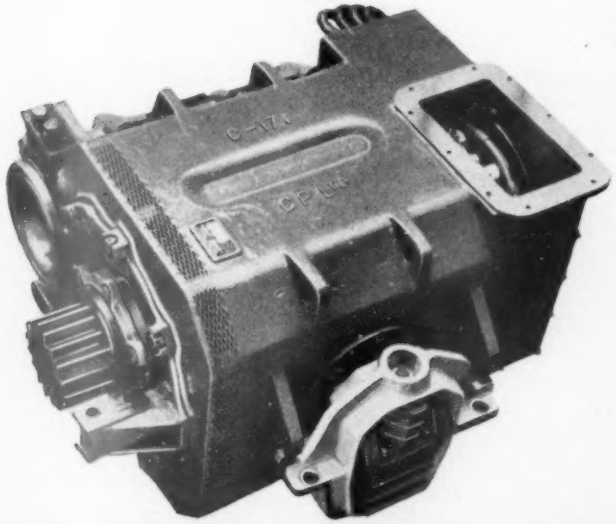
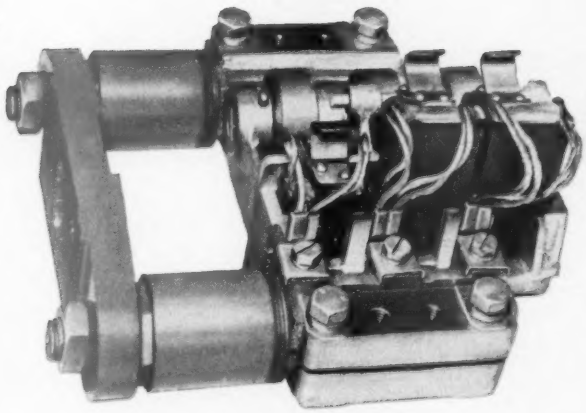


Engineers use the word performance in two senses, a limited one which refers to parameters that can be specified and checked; and a wider, vaguer, but essentially more realistic sense which covers freedom from trouble, ease of servicing, adaptability and many other things. Performance in the first sense is reproducible by any competent manufacturer; it depends on designing to well established principles. Performance in the second sense is the basis of choice between manufacturers. It comes from countless small differences in design that are based on know-how or experience.

This thing called know-how



Look at this brush-box from a traction motor; an ordinary enough piece of equipment but nevertheless embodying a great deal of experience. Note for example the very heavy insulators made from an unshatterable, non-tracking synthetic material vastly superior to porcelain. Note how the spring can be disengaged so that the brushes are easily slipped out for inspection and that the pressure on each brush can be adjusted separately. Where, owing to the design of the locomotive, there is no access to the top of the motor, the brushgear is mounted on a ring, normally clamped and dowelled in position but, when released, capable of being racked round by a gear engaging teeth in its periphery to bring each set of brushes in turn to the position from which they can be most easily reached. It is on details of this kind that performance in service depends.

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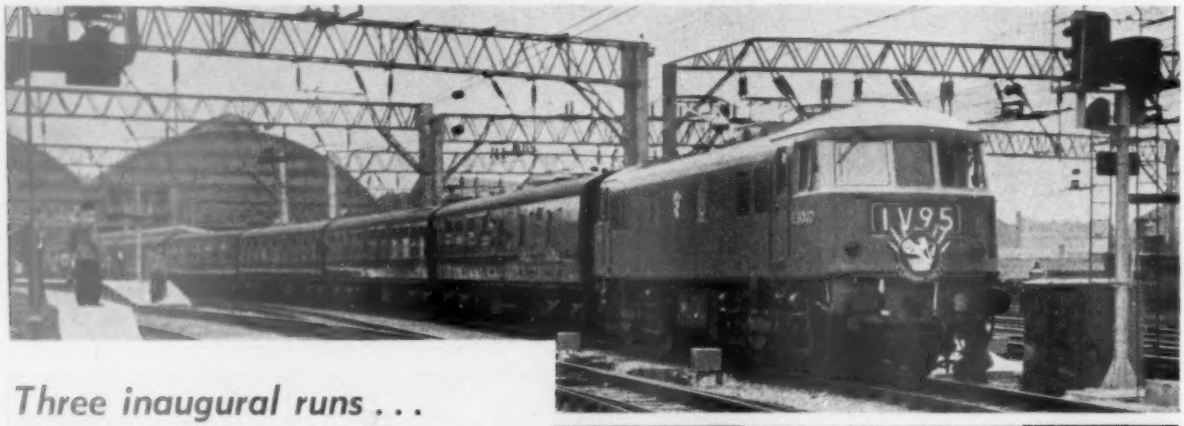

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   Powered by NBL/MAN Diesel Engines and Voith/NBL Transmissions.

3. **The first Pullman Diesel Train Set on British Railways. All these train sets are powered by NBL/MAN Diesel Engines.**

   Main Contractor :— Metropolitan Cammell Carriage & Wagon Co. Ltd., with electrics by The General Electric Co. Limited.

We also produce a range of Shunting Locomotives from 200 to 900 H.P.

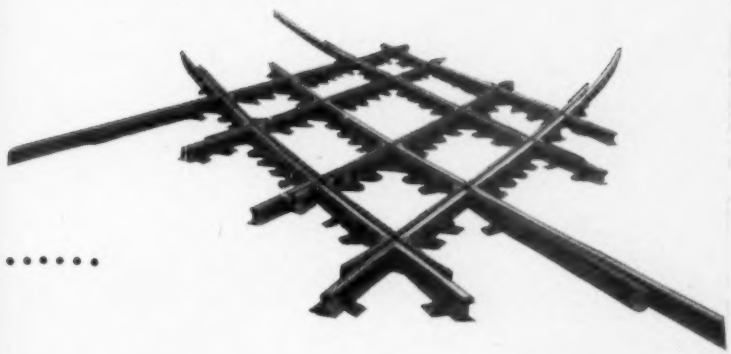
Photographs by courtesy of British Railways

NORTH BRITISH LOCOMOTIVE
CO. LTD., GLASGOW

LONDON OFFICE : Locomotive House, Buckingham Gate, S.W.1

CONTINUED DEVELOPMENT

Track Layout assembled at Hadfields Ltd., before despatch to British Railways. Fabricated from Rolled "Era" Manganese Steel rails of 109 lb. F.B. section, this junction has an overall length of 310 ft. x 30 ft. width.



Layout for British Railways comprising one nest of 16 cast "Era" Manganese Steel Single Intersection leg crossings, rail section 109 lb. F.B. Depth of castings 6¼". Approx. overall dimensions 240 ft. x 60 ft.

Solid Cast Monoblock Crossing

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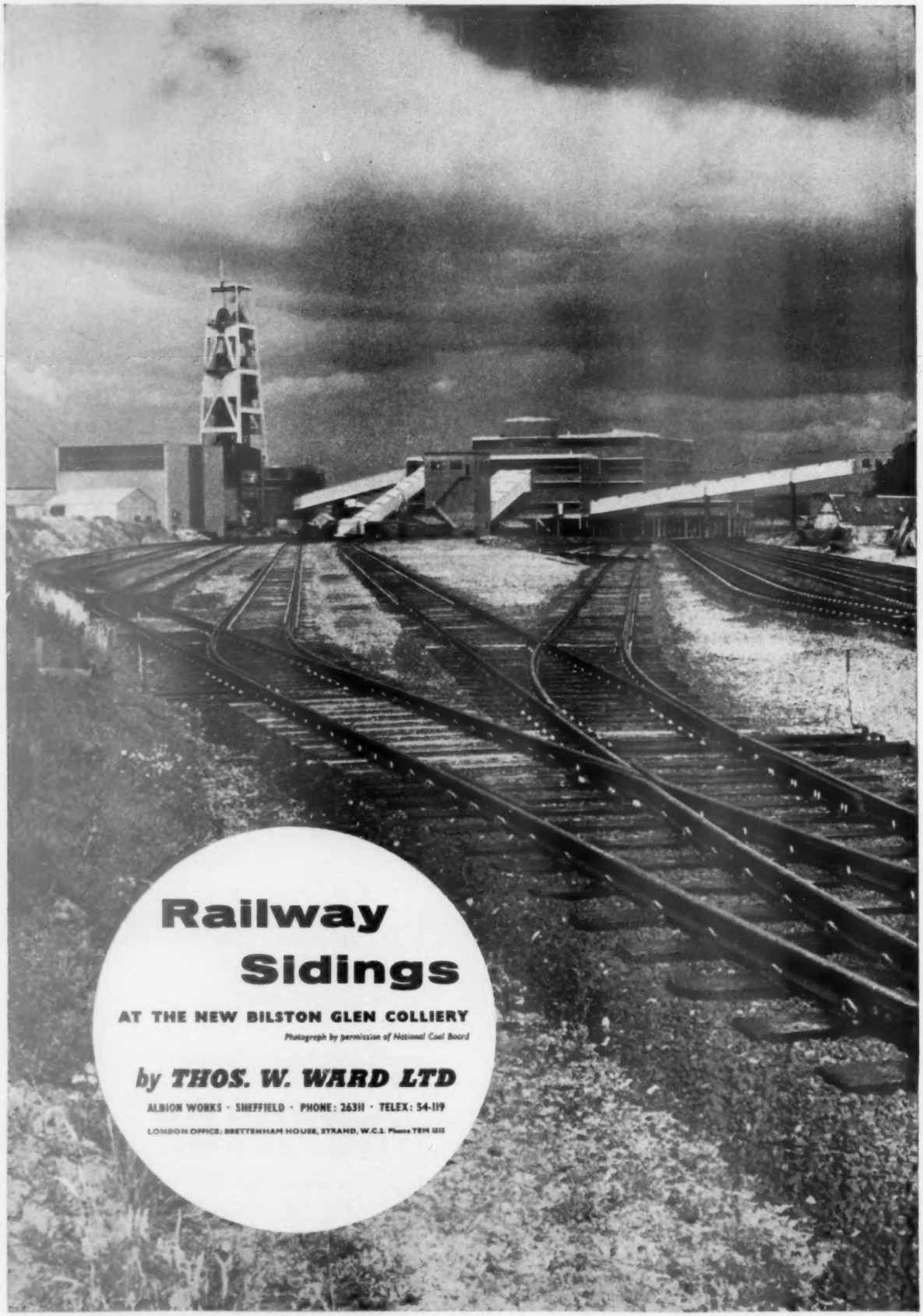
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ORINOCO buys 4 more

GENERAL MOTORS LOCOMOTIVES

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From the ore train assembly yard at Cerro Bolivar, ore is hauled to Puerto Ordaz over 90 miles of standard gauge track. Three SD9 Diesel-Electrics handle 108-car trains of 4-axle 90-ton-capacity ore cars, each of which weighs 249,000 lbs. loaded. Heavy 132-pound rail is designed for 80 kilometers (49.7 miles) per hour, which makes possible a complete round-trip time of about 8 hours. Each SD9 locomotive hauls over one million tons of ore per year.

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Illustration shows treatment of Sproughton Sidings, Ipswich. *Photo, by courtesy of Chief Civil Engineer, Eastern Region, British Railways.*

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A journal of Management, Engineering and Operation

VOL 114 FRIDAY APRIL 21 1961 No. 16

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Nationalised industries White Paper

AN IMPORTANT statement on Government policy in regard to the financial and economic obligations of the nationalised industries has been published as a White Paper (Cmnd. 1337). In brief, new administrative arrangements have been agreed in discussion between the nationalised boards and the Government, which, broadly, are applicable to all the major nationalised industries, including the Post Office. An exception is made in the case of the transport undertakings, so far as the White Paper issued in December last dealing with the reorganisation of those undertakings impinges on the proposals now put forward. The general effect of the latest White Paper is to set out a number of new requirements to be placed on the nationalised industries, with a view to improving their financial performance and so to reduce their borrowings from the Exchequer. One of the most important of the principles laid down, which covers all the industries, is that although they may have obligations of a national and non-commercial kind, they are not to be regarded as social services absolved from economic and commercial justification. Moreover, the White Paper defines more closely the statutory obligation placed on the undertakings "to pay their way." It points out that these industries should provide out of revenue not only for payment of interest on capital, but also for depreciation, and the redemption of capital, and that the operation of nationalised industries, with an unduly low rate of return on capital, is sooner or later damaging to the economy as a whole. The Government considers that surpluses on revenue account should at least be sufficient to cover deficits on revenue account over a five-year period. In arriving at the surpluses and deficits for each year, there should be charged against revenue the normal items, including interest and depreciation on the historic cost basis, as well as amounts necessary to cover excessive depreciation calculated on replacement cost basis and adequate allocations to general reserves. The five-year period replaces the phrase, "taking one year with another," or similar words, which occur in most of the statutory obligations. The Government recognises that the industries must have freedom to adjust prices upwards, but adds that financial performance is affected also by the level of costs and, to the extent that commercially unprofitable activities are imposed from outside, a board would be entitled to ask for an adjustment of its financial objectives.

Some new Budget ideas

MR. SELWYN LLOYD'S Budget last Monday contained some new ideas for economic regulation but little to assist export trade or remove the fear of inflation. The level of earned income at which surtax is payable is raised from £2,000 to £5,000, but industry has to pay the cost by an increase in profits tax of 2½ per cent to 15 per cent. The duty on heavy oils is reinstated at 2d. per gal., and this rate will also be levied on other oils chargeable at 1d. a gal. Motor-car licence duties are increased from £12 10s. to £15 a year, but buses, coaches, and invalid carriages are excepted. Television advertising is to bear a duty of 10 per cent. The Chancellor is to be able at any time to vary purchase tax and the main Customs and Excise revenue duties by up to 10 per cent. This will enable him to curb or stimulate consumer purchasing power. He is also seeking legislative sanction to impose a payroll tax in the form of a surcharge on employers of up to a maximum of 4s. a week for each employee.

More money required

THE first barrage has been fired in a campaign which was the inevitable result of allotting £24,000 a year to the Chairman of the new British Railways Board. Elsewhere in this issue we publish a statement issued by the Engineers' Guild which, observing that the Minister of Transport's stated belief in market rates for talent coincides with its own, wants an independent inquiry into salaries of railway engineering staff to bring these in line with comparable remunerations obtainable elsewhere. Interesting in this connection is the answer given by the Minister to a Parliamentary question tabled on March 22 on salaries for the rest of the Railway Board. Mr. Marples said that the salary of the new Chairman would be an exceptional one, payable to a particular person for a special task.

He did not envisage any consequential effects on the general level of salaries. He may not have envisaged it, but then neither did King Louis envisage the French Revolution. As La Pompadour so drily observed: " Après nous, le dèluge."

Public approval of diesel service

OVER 96 per cent of the passengers using the diesel service between Birmingham and Lichfield like it, according to a poll conducted by the London Midland Region of British Railways. The main attractions, in order of popularity, are: increased frequency and regularity; speed; comfort; cleanliness, and better visibility. The poll was spread over three days and covered 200 passengers ranging in age from 19 to 74, and including all categories of people. Criticisms which will be investigated from the point of view of making improvements, covered the heating system (either too hot or too cold), and the difficulty of getting seats at peak times. Young people asked for later trains from Birmingham, and many travellers favoured the introduction of a cheap-day single ticket. Since diesels replaced steam trains on the route five years ago, annual passenger-journeys have risen by nearly 250 per cent, from about 742,000 to 2,510,000.

Aberdeen-Inverness service improved

TO ATTRACT more businessmen and tourists to the north-east of Scotland, the Scottish Region of British Railways will double the number of existing diesel expresses between Aberdeen and Inverness to four daily each way from June 12 to September 8. Although the service will continue to cover the 108-mile journey in 2½ hr., two trains each way will stop at Huntly as well as at Keith, Elgin, Forres, and Nairn as at present. Improved connections will be possible from the south and businessmen will be able to spend an afternoon in Inverness before returning to Aberdeen at 5.30 p.m. Fares will be increased—probably to about 24s. ; at 18s. 6d. and yielding only 1·05d. a mile, the present fare is abnormally low. The new fare will still yield a mileage rate of only 1·17d. In return, the Region undertakes to provide fast, clean, and comfortable trains on which snack meals are available. Punctuality during March on the existing service achieved 98 per cent.

Paraguay rail offer

IN THE ABSENCE of another bid, the offer of £200,000 made last December by the Paraguay Government for the Paraguay Central Railway has been accepted. The railway, which goes back to 1889, has never paid any dividends on the ordinary capital, which now amounts to £562,930. The Argentine Government owns £220,000 of this stock. In the London Stock Exchange, Paraguay Central's 6 per cent prior lien debenture stock was dealt in last month at 17¼ per cent of its nominal value and the company's statement of last December showed that these stockholders were owed £1,017,000. Mr. H. J. Binder, Receiver & Manager for the railway, has pointed out that the offer bears no relation to the book value of the company's assets. Nevertheless, the 1958 report of the company showed a failure to improve gross receipts even after a 20 per cent tariff increase on January of that year. All in all, it is difficult to reach a realistic figure for an asset with only limited use and no alternative offer for purchase.

Steel stock-piles may fall

THE rise in stocks of finished steel seems to have stopped, and there is a possibility that stocks will begin to fall in the next few months, although actual usage is being maintained, and may even be slightly higher than last year. Demand has mainly fallen in North and South Wales, although less steel also was produced in Scotland during March. The most flourishing area of the industry continues to be the North-East coast. The investment programme of the industry itself is having an important influence on the demand for the heavier grades of steel. Exports have been very encouraging : despite a fall in exports to North America and to China, several Commonwealth and European countries have been taking larger shipments. Meanwhile, the Iron & Steel Federation has been continuing its efforts to induce the Steel Board to sanction an increase in steel prices—the Federation claims this is necessary because of increased costs of coal and wages.

C.I.C.E. information bulletin

FOR a decade, the bulletin issued by the Centre d'Information des Chemins de fer Europeens has provided the press in Europe, North America, and many other parts of the world with authoritative information about the developments of the railways of Europe in such spheres as passenger comfort, services, fares, and safety. It grew from an initial 100 copies in January, 1951, to about 2,400 in English, French, and German editions. Publication has now ceased, by reason of the reorganisation of this unit of the International Union of Railways (U.I.C.) to which we referred in an editorial article in our January 6 issue. As from the beginning of this year the C.I.C.E. (for which the Italian State Railways have been responsible since its inauguration) has been reorganised into two separate sections, one dealing with publicity, with an Italian chairman, and the other covering public relations, under Swiss chairmanship. The new setup, under the combined title of C.I.P.C.E., intends to use other means for disseminating information.

Modernisation and permanent way

EVEN though constant effort by railway public relations departments has educated the public to realise the occasional connection between delayed and cancelled trains and work on the line necessitated by modernisation, there is no widespread lay interest in the work and ingenuity constantly being exercised on the permanent way by British Railways. The track is a railway requirement so basic that its provision is usually assumed and then dismissed from the public mind in favour of more spectacular and easily-understood developments. The railway view differs. Apart from the needs of modernisation, and the fact that the permanent way in one sense is the least permanent aspect of any railway system, to the engineering mind it presents a subject of keen and continuing interest, particularly when considered as part of the same machine as the locomotive which uses it. This week, an article by Mr. R. G. Booth, Assistant Engineer (Permanent Way), Chief Civil Engineer's Department, North Eastern Region, British Railways, describes modern permanent way practice.

Heavy subsidies for Canadian Railways ?

IN URGING sweeping changes for Canadian Railways, the Macpherson Royal Commission on Transportation, whose eagerly-awaited report was tabled on April 17, has recommended measures which appear to involve subsidies totalling some $87 million during the first year, and declining rapidly thereafter in size and importance. Under the recommendations, a five-year subsidy programme would help the railways while unprofitable passenger services were eliminated—if some of these were found essential in the public interest, the Commission thinks the Treasury should meet their cost. Excessively unremunerative branch lines with low-density traffic would be eliminated over 15 years during which time losses of up to $13 million annually would be paid from a fund administered by the Board of Transport Commissioners. The controversial Crow's Nest Pass freight rate would be met by public grant, and the cost of carrying certain persons and classes of persons free of charge would be passed to the public authority.

Comment from the C.P.R.

COMMENTING on the Report of the Royal Commission on Transportation, Mr. N. R. Crump, Chairman & President of the Canadian Pacific Railway, has stated that the Commission has acknowledged that railways are essential to the economic well-being of Canada, and that they must be properly compensated for compulsory services. It has also recognised that other burdens should be eased over a transitional period. Although these findings are commendable, the Commission is mistaken in restricting the return on railway investment associated with Western grain traffic to a rate of less than 4 per cent, a figure substantially below that yielding Government funds through risk-free savings bonds. An unrealistic criterion also is used to determine which lines are uneconomic and a basic error has been made in excluding certain lines devoted to the statutory grain movement. The reasoning on future increases in freight rates appears obscure; the recommendation for imposition of an artificial limitation on pricing of services is inconsistent with the findings that the railways should operate commercially.

British praise for E. A. R. & H.

WRITING for the East African Railways & Harbours' staff newspaper, Mr. E. S. Cox, Assistant Chief Mechanical Engineer of the British Transport Commission, who visited South Africa, Rhodesia, and East Africa as the representative of the United Kingdom Railway Advisory Service (U.K.R.A.S.), had high praise for E.A.R. & H. Remarking on the grandeur of the Rift Valley as seen from a "90" class diesel driven single-handed by an African driver, Mr. Cox also was impressed by the ease with which a "59" class Beyer-Garratt steam locomotive took the steep grades and many curves of the run out of Mombasa. That port he found to rank in accommodation, equipment, and forward-looking development with any he had seen of comparable size; he also had admiration for the railway training school at Nairobi, the low cost and high quality of meals taken on trains; the comfort of train sleeping compartments, and the excellence of the engineering side of the system.

Signalling in South Africa

MR. F. G. HATHAWAY, Senior Signal Engineer, Westinghouse Brake & Signal Co. Ltd., gave his presidential address to the Institution of Railway Signal Engineers on April 5. He felt that many members had not had the opportunity of fully appreciating the amount and diversity of relatively modern signalling put in service during the past five years in countries apart from Europe. The modernisation of British Railways had resulted in increased activity in the installation of power signalling and, while a thriving home market was good for industry, he thought there was a danger that signalling engineers might become too parochial in their outlook. After describing new systems of signalling and centralised traffic control in South Africa, Rhodesia, and East Africa, Mr. Hathaway considered the industry's prospects. He believed that British equipment was still the best, but that it would only be by a combination of effort with an international outlook that manufacturers could expect to keep British Goods to the fore.

Radio on Victorian Railways

THE installation this year of radio telephones on the Victorian Railways will speed up services in the metropolitan area. It will cost £26,000 for equipment and installation. Two systems will be used—a general signal for road vans moving freight to rail heads, and a selective signal for emergency and maintenance vehicles. The freight road vans are bringing light freight from 14 metropolitan stations to Melbourne goods yard or Dynon freight terminal. Some of the radio equipped vehicles will also operate between Melbourne goods yard and Dynon. Breakdown and maintenance gangs will be able to get to electrical overhead faults, derailments, and so forth, more quickly than at present, because they can be diverted from one task to another without returning to headquarters. The selective signal will be able to call any one of the 39 vehicles to be fitted with radio telephones. Crews in radio-equipped vehicles may communicate directly to any office through the railway telephone system.

Heavy-duty rail clips and base-plates

IN OUR April 7 issue we described the Mills rail clip and base-plate which are extensively used on British Railways. On the Eastern Region, where many more Mills clips have been put into use than on the other Regions, the Civil Engineers' department has found them to be very satisfactory, because the clip itself is self-tensioning and not dependent on the skill of the platelayer during installation, and once in position it is known that all the clips are exerting approximately the same holding-down force on the rail foot. There is the additional point that there are no nuts and bolts to be kept tightened during maintenance to maintain the grip on the rail foot. There are now well over a million in use on Eastern Region track, where they have been associated almost exclusively with a programme for the installation of continuously-welded rails, where the uniformity of grip on the rail has been particularly attractive. Over the last 12 months increasing use has also been made of the Mills clip in switch and crossing layouts with results that are stated to be very satisfactory.

Work study and motive power

THE most modern industry is fighting a constant battle to reduce costs, by making the best use of its primary resources of labour, materials, equipment, and land. This battle is even more intensive in the case of a traditional industry like the railway, which has to face fierce competition while undergoing complete rehabilitation of equipment. Any means of cost reduction must be considered and the purpose of the paper "Work Study and its Application to Motive Power Activities," presented jointly by Mr. G. O. B. Clarke and Mr. W. G. F. Thorley, to the Institution of Locomotive Engineers in London on April 18, was to examine the contribution offered by work study.

The authors pointed out that work study is a vital and universal tool of progressive management, and regarded its application as a part of management's responsibility. It is a staff activity of management, as distinct from line management, and is twofold in its operation. First, by method study, management itself at all levels is subjected to a critical examination of its special functions. Secondly, by using the techniques of work measurement, it is possible to devise sound labour-control systems, on which rational financial incentive-bonus payments can be made, on a basis which enables the staff to share in the economics which can result from planned productivity. Invariably a method involving less operator fatigue, more machine utilisation, and better material economy follows from a systematic critical examination.

Incentive-bonus schemes are not an automatic follow-on of work study, nor is this undertaken only to introduce such schemes, but there is no doubt that, in general, staff is more willing to accept either method study, work measurement, or both, if some financial benefit is offered.

Following a decision of the Railways Staff Conference and because of an acute shortage of skilled artisan staff at certain motive-power depots, coupled with the difficulty in recruiting apprentices, a firm of industrial consultants was engaged by the London Midland Region of British Railways in 1956 to assist in the formulation of an incentive-bonus scheme. This was based on the principles of work study and designed to apply to the work of day-to-day repairs and examinations at motive-power depots, with the object of raising productivity, increasing locomotive availability and reducing maintenance

costs. At the same time the unions concerned, together with the Railway Shopmen's National Council, were advised of the proposed arrangements and were thereafter kept fully advised of subsequent events.

A medium-sized depot was selected, as being suitable for examination by the consultants, to ascertain whether in fact it was possible to introduce an incentive-bonus scheme, based on the principles of work study, for the artisan staff. Each item of standard examination as applicable to the various types of locomotive was broken down into elements of work of relatively short duration, and these elements were timed by an observer, who also rated the operator for speed and effectiveness of working. When the best method of doing each individual job element which could be devised at the time had been determined, and its value in standard work units established by the technique of work measurement, a work specification was produced covering the whole range of locomotive types encountered. Once a sufficient volume of work specifications had been built up, a document known as the "Standard Conditions of a Bonus Scheme for Workshop Staff" was drawn up which provided the basis of an agreement between management and staff, necessary to enable the scheme to be introduced. This document was approved by the unions concerned which left it to the local shop committee staff representatives to accept or reject as it thought fit. The staff representatives suggested some minor modifications, which were either declined by the management outright or integrated into the scheme. Throughout the whole of the negotiations, it was made quite clear to the staff that what was being offered was an opportunity to earn more money by doing more work in a given time, and that with the expected increase in productivity, there would be a decrease in overtime and Sunday duty.

Apart from the financial effects of operating the bonus scheme, it was found that there were other beneficial results. Management-staff communication is much improved. Management now knows what should be the standard staff complement for a given depot. There has been a sustained increase in the miles run per mechanical casualty, and locomotive availability has improved. Locomotive and railcar examination schedules have been brought under extremely close scrutiny, and each maintenance depot puts the same interpretation on instructions in the schedules.

So far as financial results of the pilot scheme are concerned, it has been found that despite a reduction in staff, the output in standard hours per week has been increased. Making allowances for all national wage increases awarded since the inception of the scheme, average Sunday duty payment has been reduced and average overtime has fallen.

Co-ordinating new works with traffic

IN the planning of both day-to-day maintenance and constructional works, close co-operation between the operating and engineering officers is recognised as a vital factor. In the United Kingdom and other similarly-placed countries, this is especially important in these days of modernisation added to maintenance works under heavy traffic.

The needs of improvement works often conflict with the smooth flow of traffic, and it is only by the most careful co-operative planning that successful results can be achieved. It must cover every aspect of the work and calls for detailed programming and timetables as they affect all grades of staff. In fact, the placing of full information in the hands of supervisors and other lower-grade officials is essential.

Engineering works are in two main categories: (1) maintenance and renewal, and (2) larger new works. Though many of the former call for traffic speed restrictions and occupations for short periods, some, such as bridge and formation renewals, may require facilities extending over months. Larger works spread over longer periods may necessitate detailed planning a year or more ahead, especially in respect of traffic movements to conform with public timetables. The latter, framed six months in advance of publication, are often affected by the engineer's programme, which has therefore to be prepared even earlier.

In some cases, local authorities, Government departments, and other non-railway interests have to be consulted, and occasionally Parliamentary powers may be required. At any rate, negotiations—even if only inter-departmental—are often protracted, and initially an estimate of probable overall requirements only can be made.

The foregoing matters were discussed in a paper recently presented to the Institute of Transport by Mr. I. M. Campbell, District Engineer, Eastern Region, British Railways. This paper continues to describe how recovery time is assessed, generally for each of a series of train classes with common train-load and motive power. Graphs for each class of train, considering variables of speed change, gradients, and lengths of restrictions are prepared enabling loss of time arising from restrictions to be calculated. This loss, deducted from the normal running time, gives the theoretical recovery time to be allowed. The distribution of recovery time over long journeys has also to be considered to suit punctuality at intermediate stopping stations and connections at junctions.

Line possessions are usually possible in this country only at week-ends when business traffic is absent or at a minimum and less-frequent train service makes crews and motive power available for ballast trains. The economic loss as well as the loss of "customer goodwill"—inseparable from possessions—have to be considered and balanced against the economic gain to the Engineering Department resulting from increased unit output in the longer possession usually connected with mechanised work.

Total possession, though it necessitates diversion of traffic by alternative routes and the provision of local train and/or bus services, is undoubtedly the most economical from the engineering point of view. The cost of such possessions is so great that they can be allowed only when no alternative is possible, and it is essential that the total closure of a particular section should be used to carry out all possible work on it in addition to the major work making the possession necessary. Its volume is limited only by the number of subsequent speed restrictions entailed and the manpower, ballast engines and stock available.

Alternatively, where possible, possession of one track of a double line or two tracks of multi-line sections offers many opportunities, even though operational difficulties are involved. Here again, integration of major works on the same section of line with coincident traffic facilities is the ideal to be sought.

The imposition of temporary speed restrictions requires careful consideration not only with regard to safety but also to traffic density and local conditions. Their geographical spacing—like that of possessions—is also important as are the periods during which they are in force.

Once the general scheme has been approved by all concerned, the engineer can get down to detail planning of the various works involved. He must have knowledge of normal traffic movement in the area to enable him to prepare and obtain the approval of the operating authorities to a comprehensive timetable embracing all operations and train movements. Moreover, a schedule of operations is necessary and may be either in graphical form or as timetables and lists; the former is the most comprehensive for engineers, but the latter is more suitable for subordinate staffs of all departments. It must be approved by all principal officers, but supervisors and similar grades must be thoroughly briefed in all phases of the operations. In particular the Signal Engineer's Department is almost always involved in major works and its co-operation is essential.

Control of all site-works to a tight timetable is always difficult but especially so in bad weather and at night. Movements of trains, men, and plant have to be precisely scheduled, and success, depending on maximum output, often rests upon

efficient lighting. Works preparatory to electrification are confined to lines carrying dense traffic restricting possession to an absolute minimum. They generally involve re-signalling, and increase in overbridge and tunnel clearances is effected by delicate operations under such traffic conditions.

Modernisation involves concentration of freight traffic in large marshalling yards and their construction generally necessitates drastic alterations in traffic movements and possibly inter-regional diversions. Either permanent or temporary line deviations are sometimes involved.

In all works the absolute safety of normal traffic is the first essential, closely followed by the safety of men on the work. Mr. Campbell's paper suggests improved control to ensure that plant working close alongside running lines is stopped instantly for the passage of trains. The paper contains a wealth of valuable information not found in text-books but set down from the author's wide experience; it might well be reprinted as an instructive hand-book.

A survey of Indian railways

WHETHER measured by its size or its traffic volume, the Indian railway system occupies a very important place among the railways of the world. Unlike the railways of Western Europe, it is still being extended by construction, and the successive five-year plans provide for large-scale electrification and widening of main lines to cater for the ever-increasing volume of traffic offering. International financing is enabling such work to be carried out steadily and the financial results, thanks to able management, are ensuring an adequate return on the capital expenditure.

The interest shown in Indian railway development throughout the railway world will be assisted by an excellent historical survey, recently published by the University of Delhi, entitled "Indian Railways—a study in public utility administration."* The author is Dr. Amba Prasad, and the study was originally submitted to the University as a doctorial thesis some years ago. In its revised version and published form, the survey has been brought up to date; it fills a long-existent gap in the literature on Indian railway history and development. The successive chapters cover a wide field, ranging from historical development to organisation and administrative control, with special attention directed to consumer committees, relations with the travelling public, employee-labour relations, and the economy and efficiency of railway working.

Dr. Prasad's judicial outlook is well exemplified by the sections of his survey dealing with the consumer interest in relation to the user of goods transporation—to use his terms—and to his study of the machinery for adjudication of rates. In fact, this major work in transport economics goes much further than its title implies, because the author has clearly studied intensively, not only British railway history—with its growth of Government regulation and the development of the rates and fares structure—but also similar procedures in the United States, Canada, France, and elsewhere.

A fact which will become apparent to any reader of this useful survey will be how quickly time marches on in the railway picture of today, for already time has overtaken views which but yesterday seemed quite logical. Thus, in an excellent analysis of rates theory, it is pointed out that the value of service basis used to be criticised as it might lead to monopoly profits. The statement is quite true, but there are few railways in the world today that could claim anything approaching a monopoly profit, if they earn profits at all. Some of the best sections discuss the divisional as opposed to the departmental systems of organisations and the design of an operating efficiency composite index. The value of Dr. Prasad's book is enhanced by a wealth of accurate references and an exceptionally well-designed index.

*"Indian Railways—A Study in Public Utility Administration" by Amba Prasad, M.A., A.M., PH.D.; Reader in History, Delhi University, 1960. Asia Publishing House, London

Western Region summer services

CHANGES in Western Region train services which have been made since the 1960-61 winter timetable came into force are incorporated permanently in the summer service, which will come into operation on June 13. Of these, the principal are the starting of the Up morning "Bristol Pullman" at 7.40 instead of 7.45 a.m., and its diversion via and stopping at Bath, which has entailed the 5 min. later start of the former 7.40 a.m. from Bristol, and the latter's Paddington arrival at 10.7 instead of 10 a.m. There has similarly been the diversion of the Down evening "Bristol Pullman" from the Badminton to the Bath route, also with a Bath stop, which has made it necessary to start the former 4.15 p.m. from Paddington to Bristol 10 min. earlier, to keep clear.

On April 3, all stations between Wootton Bassett and Filton Junction, on the Badminton line, were closed to passenger traffic with the exception of Badminton itself. This entailed the cancellation of only two stopping trains in each direction. On the South Wales service, the 5.55 p.m. "Red Dragon" is to be relieved on Fridays by a 5.25 p.m. restaurant car express from Paddington to Swansea, calling at Didcot and Challow (the latter in lieu of the 5.5 p.m. Down, which will not stop at Challow on Fridays) and from there non-stop to Newport; Swansea will be reached at 10.9 p.m. In the reverse direction, the 3.55 a.m. Irish boat train from Fishguard Harbour to Paddington will be decelerated 20 min. between Newport and Paddington, and will arrive at 10.40 a.m.

On the West of England main line, the 10.10 a.m. summer relief from Truro to the Up "Cornish Riviera Express" is to start from Plymouth at 12.5 p.m., and run between there and Paddington non-stop only; it will have a connection leaving Penzance at 9.20 a.m., and Truro at 10.25 a.m., 15 min. later. On Saturdays, the 1.45 p.m. from Newquay and the 4.15 p.m. from Paignton are to be combined from Newton Abbot (though making no advertised stop at that station) and will run non-stop from there to Slough, where passengers for the outer suburban area will be set down; the Paddington arrival will be at 8.55 p.m. On Saturdays, the 4.15 p.m. from Weymouth to Westbury is to start at 4.28 p.m., with a through portion from Weymouth Quay at 4.15 p.m. (in connection with the Channel Islands steamer), and will take up from Westbury the times of the 6.10 p.m. to Bristol, but will run instead to Cardiff, as last summer. It will also convey through portions from Weymouth Town and Quay to Birmingham. The 10.35 a.m. from Bristol to Weymouth will run between Westbury and Weymouth only.

Among minor alterations, all the hourly trains between Birmingham Snow Hill and Dudley since March 6 have been calling additionally at Dudley Port Low Level. In all other respects, the Western Region summer timetable corresponds almost exactly with that of 1960.

Railway traffic trends in 1961

BY A CORRESPONDENT

OVER the 12 weeks to March 26, British Railways increased passenger receipts by £2,254,000, or 8·2 per cent, to £29,584,000 compared with 1960. Receipts from parcels carried by passenger trains during the same period amounted to £12,390,000, only £18,000 above last year's figure. Higher charges, and not additional traffic, account mainly for the improvement in passenger gross train revenue. Obviously working expenses are now at a peak level and any large advance in the net revenue accruing from passenger train services is not to be expected.

Freight traffic cannot be relied on to make good losses on providing passenger services. In the first eight weeks of this year, merchandise tonnage was up 182,000 (nearly 3 per cent), and entailed the working of 38 million more ton-miles, an increase of over 4 per cent. Merchandise receipts rose by only £209,000, or 1·3 per cent. The railways originated 221,000

more tons of minerals, but worked 3 million fewer mineral ton-miles; they had a disproportionate decrease of £204,000 in revenue, or 2·6 per cent. Over the same eight weeks coal tonnage was down 678,000, or 2·6 per cent, and coal ton-miles dropped by 46 million, or 3·3 per cent, leading to a fall in receipts of £770,000 (nearly 4 per cent). Altogether in these eight weeks, the railways lost 276,000 tons of traffic (0·7 per cent), worked 10 million fewer ton-miles (0·3 per cent) and collected £765,000 less revenue (1·7 per cent).

Changes are occurring in the distribution of the aggregate volume of freight traffic put on rail. In eight weeks the London Midland lost 496,000 tons (4 per cent) and worked 37 million fewer ton-miles (also about 4 per cent), while the Western Region had a 5 per cent decrease in both tons and ton-miles. The other Regions all recorded increases. The North Eastern carried 7,188,000 tons of coal and coke, against 6,239,000 on the London Midland and 4,741,000 on the Eastern, while working 5 per cent more coal ton miles. The third number of *Transport Statistics* will furnish operating results for 12 weeks and may throw fresh light on this year's trends.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

FIVE-CAR DIESEL TRAINS

April 7

SIR, Your editorial of March 31 under the heading, " Diesel Trains," compares and contrasts the six-car sets of Trans-Pennine trains, the six-car Midland Pullman trains and the six-car Southern Region Hastings trains.

The facts, from the operating point of view, are that only the Trans-Pennine trains are six-car sets. The two other six-car sets are five-car sets with two half cars for the power equipment. As the primary object of cars is to carry passengers, these five-car sets are a distinct disadvantage compared with the six-car Trans-Pennine trains.

This point is often omitted in comparing these so-called six-car trains.

Yours faithfully,

R. WILSON

54, Fernside Road,
Poole, Dorset

RAILWAYS INTO ROADS

April 13

SIR, In your issue of April 7, " Benbow " refers to the advantages of door-to-door transport, which naturally has its appeal. But the consequences of allowing complete freedom for this development must be fully realised; one of the highest car to population ratios is said to be in Los Angeles where, because of the area that has had to be devoted to flyovers, clover-leaf junctions, and car-parks, the " city " boundaries are now 130 miles apart. In these circumstances, community life and the sense of citizenship have been radically altered. For us in Great Britain, there is the immediate question as to whether we have the room (in absolute terms) apart from its social desirability. The Los Angeles authorities, like those of several other major cities in North America, are considering rail projects as being the only practical solution to their future transport problems, and we would be wise to heed the warning.

In the case of our M.1, an area of land 70 miles long and a minimum 112 ft. wide has been occupied. With an efficient system of transport, only one-third of that width would be required, and it is questionable how much land this country can afford to have sterilised in this manner.

As regards the problem of dovetailing long-distance with stopping services, the new forms of traction are particularly suited to this, as is shown by the experience of such countries as Switzerland, Holland, Belgium, and others. The postwar rehabilitation of the Dutch Railways provided some interesting studies in traffic engineering, which have been strangely neglected by the exponents of that subject. Switzerland shows how to integrate stopping, semi-fast, and long-distance services, including international trains, together with heavy goods traffic, in many cases over single track. Also, their services connect with the numerous mountain and light railways, giving connections from distant points in Europe to the smallest places in the country. The Swiss have pursued a realistic policy of converting their system from deficit to one of the most profitable in the world, which is a remarkable achievement for a mountainous country of only 5¼ million inhabitants, with the largest city only 600,000.

As for air competition, the latest figures show that the railway competes with air in terms of overall time for distances of up to 300 miles; but this is with the T.E.E. trains, whose maximum speed is 87 m.p.h., so that with the introduction of faster units the railway " net " will be spread still further. But in any case, if a train taking four hours from London to Edinburgh is unable to compete with the air, what would be the fate of coaches taking double that time ? The proposed conversion would be tantamount to making a gift of this traffic to the air, and it is only reasonable that the faster mode of transport should be given the chance to compete. Strictly, if the air-rail rivalry has any bearing at all on the proposed rail-road conversion, it can only be as an argument in favour of the reverse, namely, the conversion of roads into railways.

Yours faithfully,

A. W. T. DANIEL

3 Hall Way,
Purley, Surrey

April 13

SIR, " Benbow's " latest letter, in your issue of April 7, is not even accompanied by Brigadier T. I. Lloyd's extraordinary sort of arithmetic. He does remark on the importance of door-to-door travel, of which we are all aware, and on account of which we buy motor cars. But it is a natural inference that we would use those cars on the converted railways.

One notes that the Railway Conversion League has come round to the idea of greatly widening, at a price, existing railway formations. At first, such a prospect was pooh-poohed on the grounds that most British roads were no wider than double-track railways and some of them less. How wide would it have to be between Shenfield and Liverpool Street ? One must allow for five passenger seats a second, plus sufficient extra to replace standing room, which is not mentioned in respect of the R.C.L.-type bus. How wide would be Clapham Junction ? It must carry the motor equivalent of a crowded train every 20 sec. in the rush hour.

Assume, then, that private cars are excluded, and trains replaced by specially-designed buses and lorries. What is the advantage of a tied bus, or a tied lorry, which, *ipso facto*, are smaller than their railway equivalents but still too big for a minor road ? They would simply be less comfortable, and less capacious, than what we have now, besides being subject to continual human guidance and rather vague signalling. One notes that " Benbow " does not mention freight in his last letter. Railways, apparently, are essentially passenger carriers. Try telling that one in Leeds, or Chicago, or Dusseldorf !

Yours faithfully,

C. HAMILTON ELLIS

" Southesk," Mannings Heath,
Horsham, Sussex

The Scrap Heap

Simple logic

While travelling in the rear coach of an express train, recently, a dear old lady, who had previously registered some alarm at her enforced position in the train, suggested to her fellow passengers that the rear coach always bore the brunt in an accident. She had a very logical remedy, " Why not," she said, " simply remove the last coach before the train starts its journey ? "

Comfort at crossings

Much ingenuity has been expended in promoting smooth riding over switches and crossings, and various attempts have been made to abolish gaps at the V. The example illustrated was an American idea to provide more continuous support for the tread. It will be seen that the movable rail was elevated to a height sufficient to give flange clearance at the point of crossing. The idea would have called for first-class maintenance, a feature not always associated with American track of the period, and greater benefits would have been derived from attending to the other end of switches, where ultimately the stub was replaced by a tongue.

Centenary

On Monday next is the day fixed for the opening of the new station at Wraysbury and Horton. During the past winter the building has been progressing steadily, and not only is the present spot (near the paper mills) much more eligible and affords to all a more ready access both for foot and carriage passengers, the train approaches on either side of the station must be generally approved, saving, as they do, the passing over the bridge across the line. This station will be handy for Colnbrook as well as Wraysbury and Horton and it should bring increased traffic to the London South Western Railway Company.—*From the "Windsor & Eton Express," March* 30, 1861.

Oldest Civil War veteran ?

The centenary of the outbreak early in 1861 of the War Between the States is a reminder that this was the first major conflict in which railways played a leading part. The last human survivor of the American Civil War died in 1959 at the reported age of 117. The oldest veteran today, if a locomotive preserved but long since withdrawn from service can be so counted, is probably the engine *General* of the former Western & Atlantic (now Louisville & Nashville) Railroad. The story of its capture in April, 1862, by Federal raiders and of the recapture by the Confederates after a 100-mile chase, has been told in many books and articles, at least one ballad, and films. The *General* is now preserved at Chattanooga, Tennessee; there, in the National Cemetery, are buried some of the Federal soldiers who were executed as spies after being captured during the episode, and one of the most striking monuments is that bearing a bronze replica of the locomotive.

An American idea to provide a jolt-free crossing

Push-and-pull

One of the " battles " between British railway companies in the earlier days was described in a recent B.B.C. broadcast by Clive Price. It was fought at Clifton Junction, Lancashire, in 1849, when the Lancashire & Yorkshire Railway Company refused to allow trains from Bury, operated by the rival East Lancashire Railway, to use its line from Clifton Junction to Manchester unless they stopped first at Clifton for a ticket check. The L.Y.R. at first was not in a position to enforce its decision because the Clifton signalbox was controlled by the East Lancashire. But at 10.30 a.m. on March 12, shortly before the first E.L.R. express to Manchester was due to pass, L.Y.R. staff, supervised by members of their board, placed a " high wooden boom " across the track and a L.Y.R. train stood on the Manchester side of this. The East Lancashire train was stopped by signal and passengers asked to show their tickets. E.L.R. men thereupon removed the boom without opposition and the train moved forward to the L.Y.R. train. " Like two champions the two trains pushed and shoved, surrounded by great clouds of steam. . . . " The Lancashire & Yorkshire brought a second train from Manchester to push behind the first, and the East Lancashire shunted a ballast train in the path of L.Y.R. trains to Manchester. Eight trains were held up. At 1 p.m. the Lancashire & Yorkshire directors retired for lunch. On the following Saturday an agreement was reached between the companies whereby E.L.R. trains could pass Clifton without stopping.

Good time had by all

The inauguration of the Bridge of Kehl, connecting the Strassburg and Baden Railways, took place on April 6 as announced. Next morning at 9 a train proceeded to the bridge with guests. After crossing the bridge the train stopped and the company alighting examined the works in every part. The train afterwards returned to Strassburg, where a grand banquet was given at the Hotel de Paris. The dinner lasted nearly three hours. Next day a grand fête was given at Baden. —*Condensed from " The Scotsman " of April* 12, 1861.

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

VICTORIA

Advertising on "Harris Trains"

A private contractor will furnish multi-coloured plastic signs, illuminated by fluorescent tubes, for new-style advertising in the interiors of "Harris Trains." They will be 24 in. by 6 in. and attached above dividing partitions of carriages. There will be two signs in each carriage.

"S" class locomotives

Fourth of the new "S" class locomotives ordered for the standard-gauge service between Albury and Melbourne was scheduled for delivery in Melbourne at the end of last February, from the Clyde Locomotive Works.

QUEENSLAND

Unremunerative branch lines

Nine more unprofitable branch lines are to cease operation on the Queensland Railways from next July 1. This will effect a saving of £250,000 a year. The lines to be closed include the 22 miles linking Ernest Junction and Tweed Heads, and the Cooktown-Laura line. The closure of the Tweed Heads section will allow for business expansion in the centre of Coolangatta, for the land occupied by the Railways Department will be made available to the public.

WESTERN AUSTRALIA

Rail and road service receipts

Approximate railway and road service receipts reported by the Midland Railway Company of Western Australia Limited amount to £A605,085 for the seven months July, 1960, to January, 1961, an increase over the corresponding period last year of £A53,137.

W.A.G.R. film shows for passengers

Passengers travelling by train to Western Australia who are forced to spend a short time at Kalgoorlie because of break of gauge are shown a programme of films at Kalgoorlie Station as guests of Western Australian Government Railways. The films, which are provided by the Western Australian Visual Education Department, depict interesting aspects of tourism, industry, and life in Western Australia. Screenings take place in the recently modernised refreshment rooms. The projector was jointly supplied by Western Australian Government Railways and the Tourist Development Authority. Five honorary projectionists from Kalgoorlie operate the projector on a voluntary roster system.

CANADA

January operating results

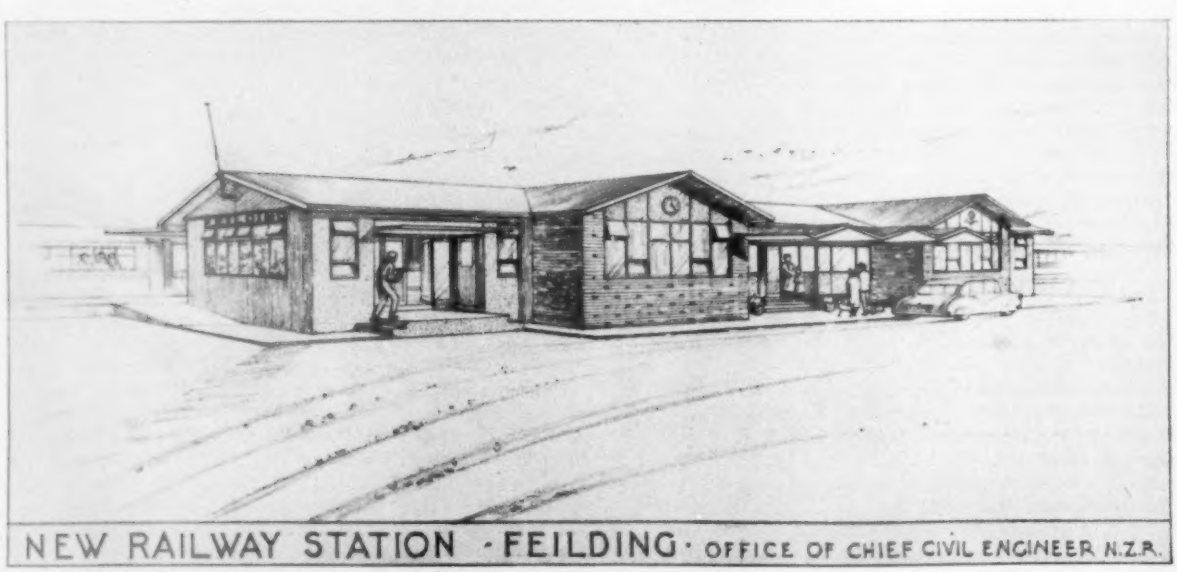
Operating revenues of Canadian National Railways for January, 1961, amounted to $51,868,000. Expenses, taxes, and rents totalled $56,880,000, resulting in a net operating deficiency for the month of $5,012,000. In January, 1960, operating revenues were $53,655,000; expenses, taxes, and rents were $60,107,000, and net operating deficiency was $6,452,000. These figures do not include any provision for fixed charges.

U.S.S.R.

Progress on Soviet railways

According to the U.S.S.R. Minister of Railways, goods carried on the Soviet railways has already reached the level scheduled for 1961 under the Seven-Year-Plan. This has been achieved through the growth of freight carriage in tons, side by side with a drop in the average distance that goods are carried. The Minister said that, during the past seven years, a great deal had been done to increase

NEW ZEALAND STATION CONSTRUCTION



Sketch of railway station under construction at Feilding, New Zealand

goods-carrying capacity in the Urals, Siberia, and Central Asia. Between 1954-60, over 3,000 km. of railways were built and put in operation in those areas, together with 2,800 km. of second track. A total of 1,700 km. was switched over to electric traction and stations and sidings had been built. A further 8,000 km. of railways will be switched over to electricity.

Railways for virgin lands

The U.S.S.R. Ministry of Railways has adopted a decision on the expansion of railway transport in the Tselinny (Virgin Land) territory of Kazakhstan. About 135 miles of new lines will be put in service before the end of the year, and a further 186 miles will be completed in 1962-65. The total length of operating railway lines in the territory now exceeds 1,860 miles.

Transport at 1967 World Fair

The exhibition grounds of the 1967 World Fair, which will be held in Moscow from May 20-November 20, 1967, will be linked with the city's centre by two new lines of Moscow's underground railway and other transport services.

FINLAND

Activity initiated by staff

Activity initiated by the staff of the Finnish State Railways in 1960 included 115 suggestions for improving methods of working. Seven prizes were awarded.

Rolling-stock

At January 1, 1961, the Finnish State Railways possessed 28,230 wagons, including 22,725 freight wagons, (9,459 covered wagons, 12,900 open wagons, 360 tank wagons, and six well wagons.) The number of wagons for the railways' own transport was just below 4,000. The number of passenger coaches was 1,533 with total seating of about 76,200.

Tractive stock

The tractive stock of the State Railways at January 1, 1961, included the following units (corresponding figures for January 1, 1960 are given in parentheses): Steam locomotives 659 (680); diesel locomotives 129 (94); motor-coaches 25 (28), and railcars 167 (146). 21 steam locomotives and 3 powered coaches were scrapped during the year. In 1951, steam locomotive stock comprised 823 units.

Wagons taken into traffic

During the year, 910 railway wagons were put in traffic, 27 privately owned. The new vehicles included 802 open wagons, 59 covered wagons, and 22 trailers for railcars. Ten of the covered wagons are equipped with sliding roofs and sliding walls. The covered wagons also included 41 reefers. As part of the modernisation programme, 200 refrigeration wagons are to be built. The open wagons included 663 Hk-wagons (designed for timber transport), 15 Oa-, 97 ballast- and 25 ore-wagons.

Connecting traffic with the U.S.S.R.

Connecting traffic on the frontier station in Vainikkala decreased in 1960 by about 5 per cent compared with the previous year. Traffic in 1960 was about 3·3 per cent below the average of the years 1953-59. Exchange of wagons over the frontier averaged 290 units a day—the corresponding number in 1959 was 310. Freight traffic was at its best in March. 21,343 passengers crossed the frontier at Vainikkala last year against 16,698 passengers in the preceding year. Passenger traffic was at its best in July, passenger-numbers reached 4,166.

DENMARK

New diesel-electric locomotives

The first of a new series of diesel-electric locomotives has been delivered to the Danish State Railways. The locomotives are of 1,000 h.p. and classified " MX."

RHODESIA

Minister gives " Sundowner " party

The Federal Minister of Transport of Rhodesia & Nyasaland held a " Sundowner " party on March 13 for African trade union leaders, following the inauguration of the Statutory Industrial Council for the railway undertaking. The S.I.C. is a new body set up under the Railways Act to negotiate conditions of service between the railways and the trade unions. The picture which appears above shows : Mr. J. H. Allen, General Manager, Rhodesia Railways ; Mr. A. D. Citala, Acting President, Railway African Workers Union, and Mr. W. H. Easterwood, Federal Minister of Transport, at the party.

A group of guests at the " Sundowner " party held for African Trade Union leaders by the Federal Minister of Transport

INDIA

Udaipur-Himmatnagar construction

Cutting the first sod of the new Udaipur-Himmatnagar line on the Western Railway of India, the Indian Minister for Railways pointed out that it would enable the mineral resources of the area traversed to be tapped and open up a large tract of country at present with no adequate communications. The construction cost of this metre-gauge cross-country connection is estimated at nearly £8 million; it will reduce the distance between Udaipur and Ahmedabad from 336 to 196 miles. It is understood that it will facilitate the mining of zinc and lead and also iron and uranium ores. The construction is being undertaken by the Western Railway and the new line, about 125 miles long, will connect two existing sections of its metre-gauge system.

Baoridand-Karonji construction, S.E.R.

The South Eastern Railway extension from Baoridand to Karonji is nearing completion and expected to be open for mineral and goods traffic about June or July. Branching off from the Anuppur-Chirimini section, this 57-mile extension is required to tap the neighbouring Central Indian coalfields and carry the coal to Bhilai steelworks.

CARRIAGE AND RAILCAR BOGIES
their design and development—II

Second section of five-part article covers swing links and springless bolsters; lateral displacement ; swaying and dampers

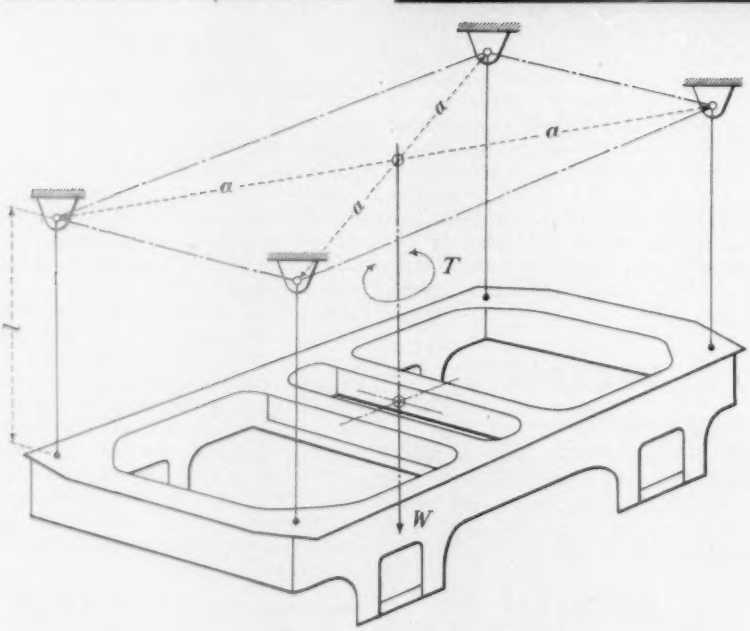
by **J. L. KOFFMAN,** *Design Engineer (Projects), Chief Mechanical Engineer's Department, British Railways Central Staff*

THE effective length of the bolster swing links or equivalent devices should be chosen to reduce the transmission of transient lateral forces to a minimum. This requires long links. On the other hand, resonance of body oscillations with sinusoidal wheel motion must be avoided at operationally important speeds.

Because of this, resonance speeds should be determined for new tyres as well as for the different conditions of tyre-wear down to an effective conicity of 1 in 7 in the vicinity of the flange. The magnitude of transient lateral forces can be reduced by maintaining single-point contact between wheel and rail. This requires the use of rational tyre profiles evolved along lines first proposed by Heumann some 30 years ago.

Swiss and German use

Profiles of this type now used in Switzerland and Germany, apart from improving riding qualities, have also increased the mileage between tyre-turning by some 30 per cent. In addition, such design parameters as distance between bogie centers, body overhang, and weight distribution are of importance as far as lateral response to transient forces is concerned. Failure to consider these factors has often led to disappointments when bogies evolved for one set of conditions were transplanted to meet quite different requirements in terms of the above parameters and track conditions.



MOMENT OF INERTIA : $I = W\frac{a^2T^2}{4\pi^2 l}$

T = TIME OF ONE CYCLE, ACCURACY WITHIN 0·01 sec. AVERAGE OVER A NUMBER OF OSCILLATIONS

Above and left (Fig. 1)—Determination of moment of inertia of bogie about vertical axis

Particular attention must be paid to nosing characteristics, which should be determined for the entire range of loads, i.e., moments of inertia. Determination of the moment of inertia of a bogie about the Z-axis is shown in Fig. 1. Because of limited crane availability, the work was carried out at night.

The action of the swing links and centering devices should be assessed in terms of ride index values relating to oscillations at floor level. Thus, link length should be governed by considerations relating to steady state oscillations as well as to occasional impacts. Generally, an effective link length of 16 to 20 in. and more should be considered.

Swing links

The desirability of using swing links or equivalent devices has been confirmed by theory and experiments, the latter showing that the lateral forces between axlebox and frame of locomotives running through curves can increase by 50 to 80 per cent when locking the bolster in the lateral plane, Fig. 2. Increased link length can also appreciably improve the riding qualities in the lateral plane. Thus replacing inclined links with an effective length of 7½ in. by vertical ones with an effective length of 21 in. has

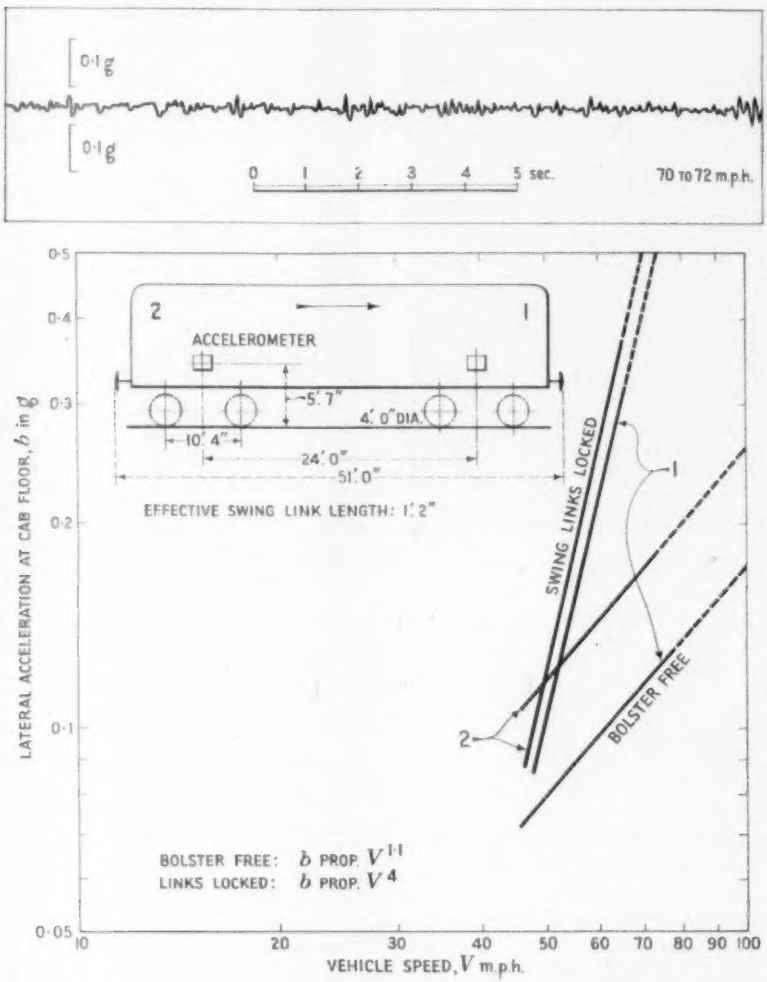


Fig. 2—Lateral accelerations over bogie centres of locomotive with free and locked swing links

reduced the ride index value from 3·1 and 3·6 at 50 and 75 m.p.h. to 2·3 and 2·8, respectively. Particular attention must be devoted to the proportioning of swing links of bogies used under vehicles with uneven weight distribution such as railcars carrying heavy engines at one end. (See Figs. 3 and 4 and top illustration on page 448).

Effective link length

It should be mentioned that, with "knife-edge" and similar swing-link supports, the effective link length is often shorter than the actual one. The influence of the main variables is shown for vertical hangers in Fig. 3 with the aid of an equation originating from P. van Bommel. It is suggested that not enough attention is paid to this matter when deciding on the arrangement and dimensions of swing-link ends of this type. The effective length of swing links can be increased by making use of the lateral flexibility of helical bolster springs, provided that resultant dynamic spring stresses are within acceptable limits.

The use of helical springs in this manner is sometimes considered as "unnatural," but it is both rational and successful with a considerable number of diesel and electric railcars and heavy diesel road locomotives. However, with helical bolster springs used as the sole means of dealing with lateral body oscillations, the equivalent effective swing link length does not exceed 8 in.

Bolster without springs

Recent experience with bogie locomotives running at up to 80 m.p.h. has shown that bolster springs can be dispensed with, provided that helical springs ensuring a static deflection of 4 to 5 in. can be employed with the primary system.

Suitably long swing links should be provided between bogie and body, but the absence of bolster springs and the resultant saving in space as well as the elimination of vertical displacement between bogie and body frame will appreciably facilitate the installation of the traction motor for the middle axle of six-wheel bogies.

The riding qualities of a locomotive with primary springs and swing links alone and driven by axle-hung motors are shown in Fig. 4. Attention is drawn to the fact that, for a static deflection of 5 in. and a resultant dynamic deflection of up to about $0{\cdot}4\sqrt{5}=0{\cdot}9$ in., provision of fully-sprung motors might present difficulties, while design of the motor nose suspension will also require careful consideration in terms of its possible dynamic effect on commutation.

Lateral displacement

The lateral displacement at cantrail or at pantograph level merits careful consideration because of loading gauge and contact pan width limitations. Here, it will be advisable to assume an unbalanced lateral force, equivalent to 10 per cent of the body weight, applied at

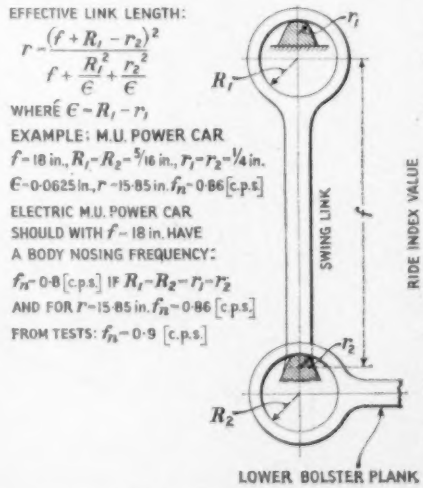


Fig. 3—Effect of "knife edge" and saddle radius on effective length of vertical swing link

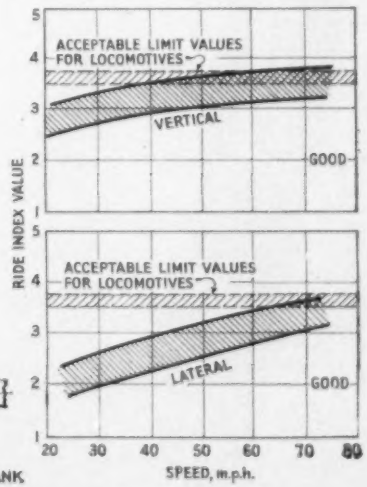
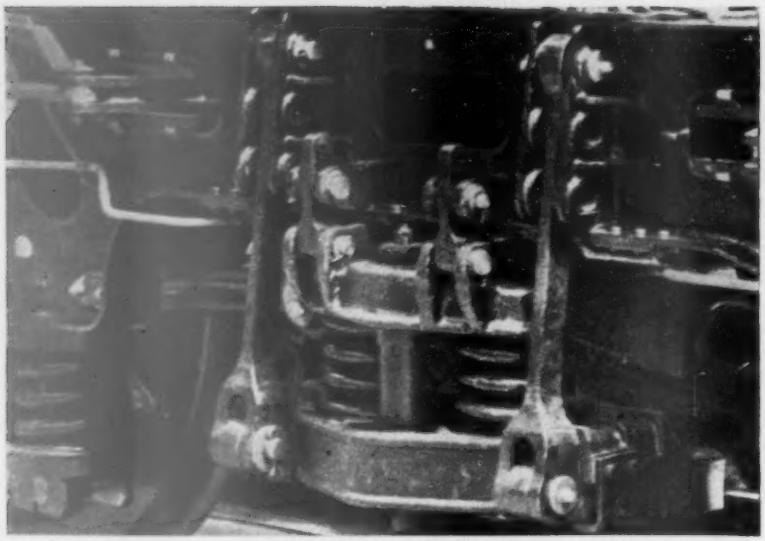


Fig. 4—Ride index values of locomotive with bogies incorporating primary springs and swing links only



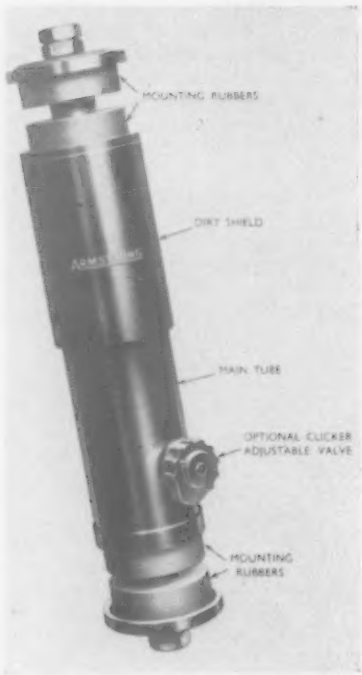
Bogie development can be facilitated by testing swing links of varying length

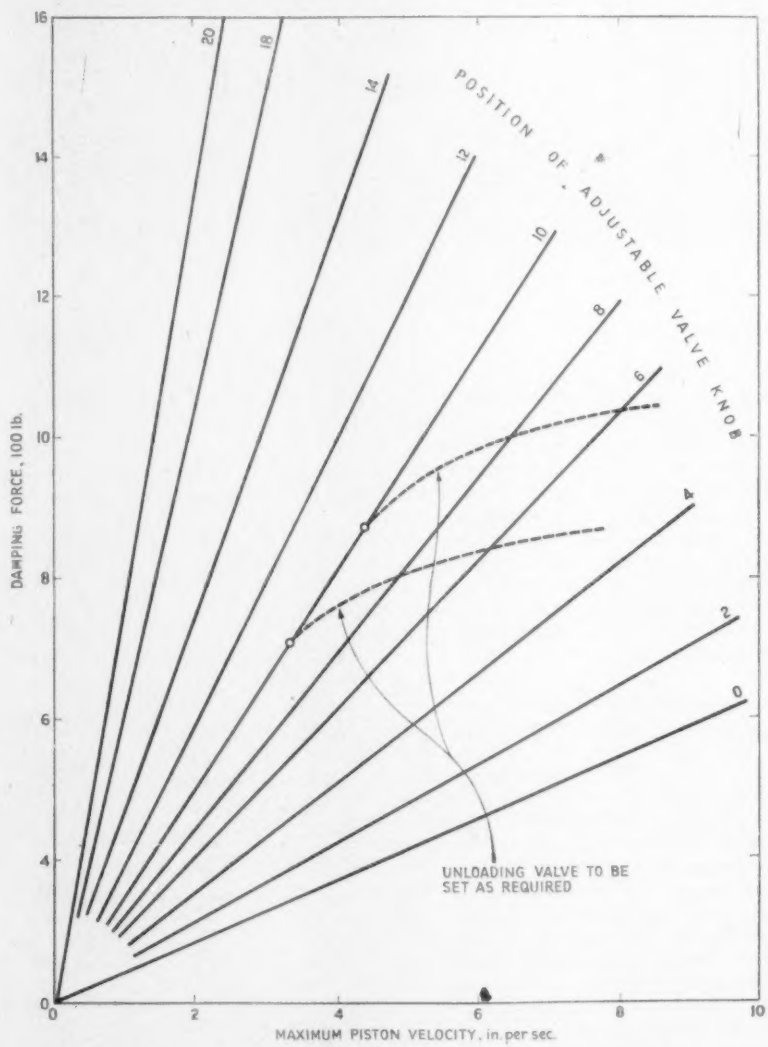
its centre of gravity.* This force will displace the body laterally through a "free" distance equivalent to 10 per cent of the effective swing-link length and will also force the body to roll on the springs through an angle determined by spring stiffness, width of the spring base, and distance between (approximately) the top of the (helical) bolster springs and the body centre of gravity.

*Measurement of forces between axles and axlebox covers of modern bogie locomotives at speeds of 75 to 100 m.p.h. have shown these to amount to 0·25 to 0·3 of the axle-load. This must be allowed for when stressing bogie frames. To cover possible contingencies a value of 0·4 should be allowed for

To facilitate development and, provided previous calculations show this to be desirable, it might be advisable to permit the use of swing links of different length to ascertain the best length as far as body nosing and swaying is concerned (Fig. 4).

If the resultant total lateral displacement is in excess of the permissible value, it will be necessary to consider use of inclined links, widening the spring base, stiffening the springs, or introducing progressively stiffening springs. This can assist in reducing the angle of roll, or progressively stiffening lateral control devices reduce the lateral displacement of swing links. This measure requires careful consideration, for its aim should be to reduce maximum displacement without adversely reducing effective link length when subjected to small amplitude displacements or transient forces. Because of this, additional centering forces should, if possible, be scarcely effective for the first half inch or so of bolster dis-





(Left): vertical damper with adjustable characteristics. (Right): adjustable performance characteristics of vertical damper

placement. Resistance should then increase gradually, and the combined link and centering device force at maximum displacement should increase to a magnitude of not less than 10 per cent of the vertical load.

The maximum displacement and required resistance force should be checked for all load conditions, for these affect both lateral force and height of the body centre of gravity above the instantaneous axis of rolling.

To ensure good riding in the vertical plane without facing the penalty of undue rolling, a wide spring base should be achieved. Values of about 4 ft. 6 in. encountered even with modern vehicles are quite inadequate, and at least 6 ft. to 6 ft. 6 in. should be the aim with standard-gauge vehicles. On the other hand, undue roll also can be reduced with the aid of torsion bars coupled between upper and lower bolster plank, as successfully applied to multiple-unit stock.

Swaying

It now is necessary to determine the two natural frequencies of the swaying oscillations. At the lower frequency, the vehicle body will generally oscillate about the axis near (above or below) rail level, while at the higher frequency, the body oscillates about an axis often at the level of the head of seated passengers, or slightly above.

The designer's aim should be to keep the lower frequency as low as possible (about 0·5 cycles per sec.), so that resonance with nosing excited by sinusoidal wheel motion and the Zα-motion should be encountered at low, operationally-unimportant, speeds. At the same time, careful check should be made regarding likely magnitude of maximum amplitudes. The higher swaying frequency should be preferably so high (about 2 cycles per sec.) that it comes well outside maximum speed.

As the magnitudes of these two frequencies depend on the frequencies of vertical, lateral, rolling and combined oscillations, they will be affected by a number of fundamental design factors. It is very important to get the frequencies and amplitudes of swaying right in the first instance, for subsequent design changes might be of little avail unless major alterations are considered. It is also important to ascertain the effect of varying loads and of tyre wear on swaying over the entire speed range, for these oscillations are excited by nosing (γ-motion), and the coupled motions of Yγ-hunting, Xγ-oscillations, α-rolling, and Z-αmotion.

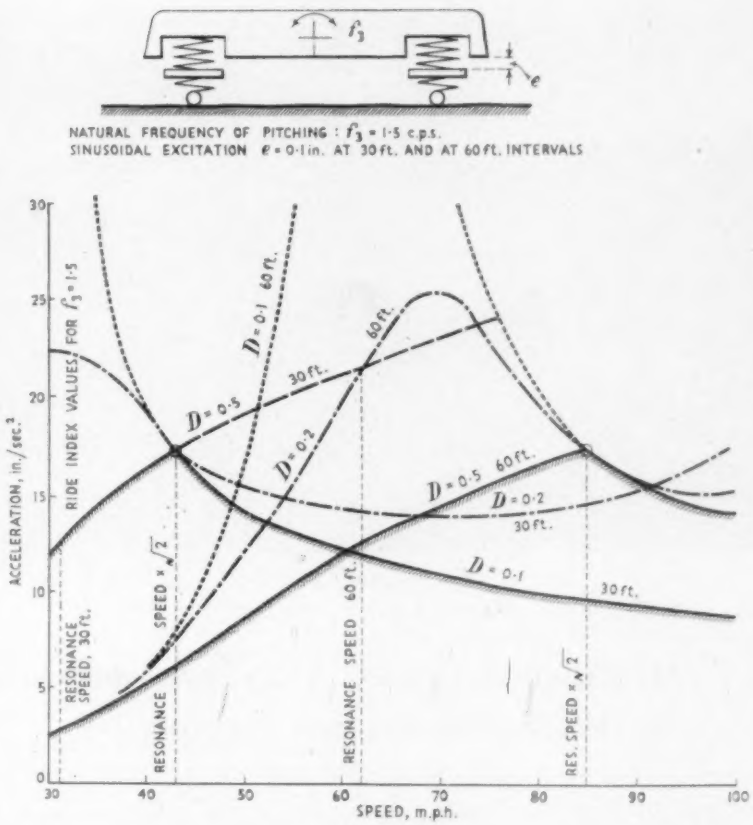

f_3
e
NATURAL FREQUENCY OF PITCHING : f_3 = 1·5 c.p.s.
SINUSOIDAL EXCITATION e = 0·1 in. AT 30 ft. AND AT 60 ft. INTERVALS
RIDE INDEX VALUES FOR f_3 = 1·5
ACCELERATION, in./sec.²
SPEED, m.p.h.
D = 0·1 60 ft.
D = 0·5
30 ft.
60 ft.
D = 0·2
D = 0·5 60 ft.
D = 0·2 30 ft.
D = 0·1 30 ft.
RESONANCE SPEED, 30 ft.
SPEED × √2
RESONANCE
RESONANCE SPEED 60 ft.
RES. SPEED = √2

Fig. 6—Vehicle performance could benefit from damper adjustment with speed. As this is complex, constant setting can provide a satisfactory ride

Damper resistance (force as a function of piston-displacement velocity) should be based on the requirement that the combined vertical damping factor D for primary and secondary suspension should be about 0·2 to 0·25 of the critical value. For bolster spring assembly, a damping factor of about 0·2 should provide optimum results. In the lateral plane, damping factor should be about 0·4 of critical value. The final design value should be determined as a compromise for the various loads (masses) and their effect on the natural frequencies of pitching and nosing oscillations as well as the effect of tyre-wear on the latter. Heavy lateral damping can promote undue roll on bolster springs.

Damping inherent in bogie

Due allowance must also be made for friction damping inherent in the bogie. With modern bogies using helical or similar springs throughout, this is low and can be generally assumed as equivalent to about 0·05 of the critical value. Because of these extraneous factors, final determination of characteristics will be facilitated by dampers incorporating adjustable control (Fig. 5).

To ensure low accelerations, the damping factor D should ideally be adjusted with speed, provided the excitation impulses are encountered at regular intervals. Apart from technical difficulties, excitation frequencies are spread over a wide range. At present, a damping factor of 0·2 to 0·25 provides the best

Continued on page 453

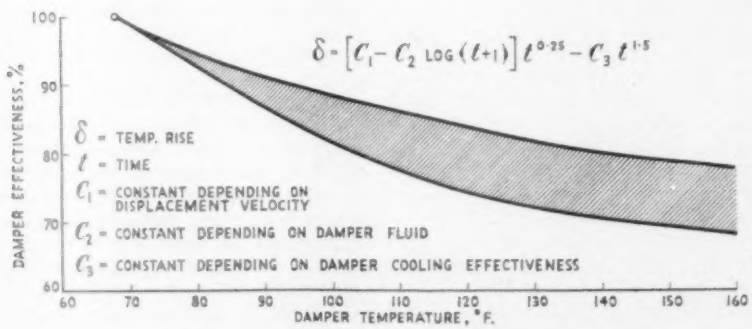
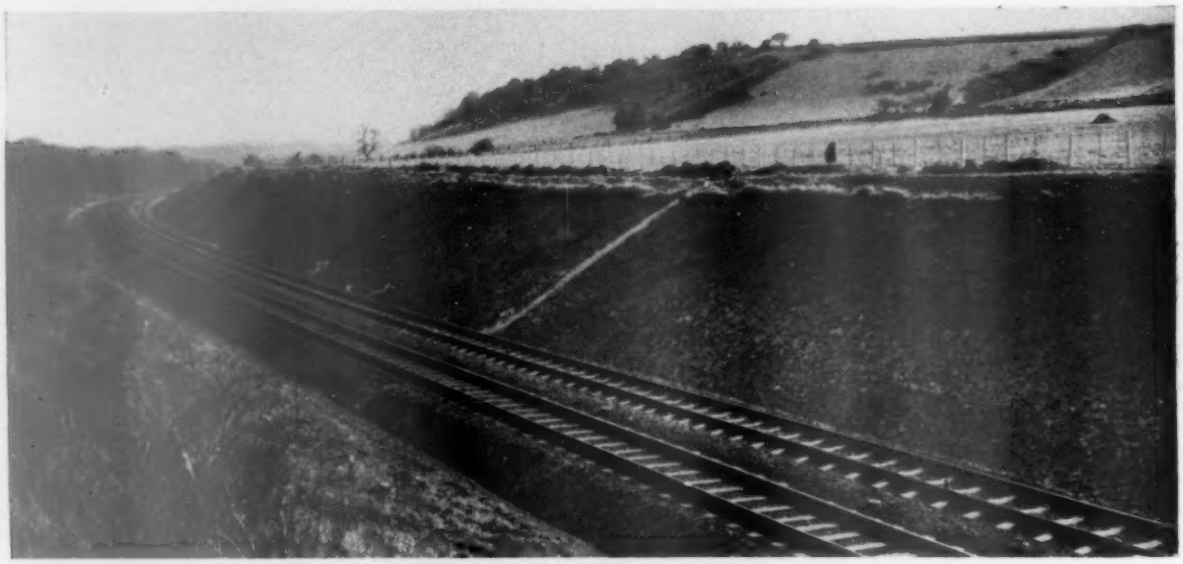

$\delta = \left[C_1 - C_2 \log(t+1)\right] t^{0.25} - C_3 t^{1.5}$
DAMPER EFFECTIVENESS, %
δ = TEMP. RISE
t = TIME
C_1 = CONSTANT DEPENDING ON DISPLACEMENT VELOCITY
C_2 = CONSTANT DEPENDING ON DAMPER FLUID
C_3 = CONSTANT DEPENDING ON DAMPER COOLING EFFECTIVENESS
DAMPER TEMPERATURE, °F.

Fig. 7—Effect of damper temperature on performance



Embankment on East Coast main line showing strengthening

MODERNISATION AND THE PERMANENT WAY in the North Eastern Region

Some aspects of the needs arising from modernisation and the measures taken to meet them

by **R. G. BOOTH,** *Assistant Engineer (Permanent Way), Chief Civil Engineer's Department, North Eastern Region, British Railways*

THE British Railways modernisation and re-equipment plan aims to produce a thoroughly modern railway system able to meet both current and future traffic requirements. It fully envisages the need for extensive track-work to meet the effects of new forms of motive power which would have heavier axle-loads and smaller-diameter wheels. In some cases, motored axles running at higher average speeds would have an effect on the track of a much greater degree of severity than their steam-operated predecessors.

In considering the policies to be pursued, account has been taken of the need to provide for such factors as the installation of modern colour-light signalling, and the eventual possibility of electrification of certain scheduled lines.

Works envisaged

The works envisaged fall under five principal headings, these are: earthworks, drainage, ballasting, design of stronger track, and realignment of selected curves to permit higher speeds.

In the first instance, standard cross-sections of track in cuttings, embankments, and level territory showing agreed dimensions for earthworks, cable ducts, signals, and overhead electrical equipment were agreed between the chief technical officers. The next stage was to ascertain the full extent of the work involved together with an indication of the probable cost in respect of each line scheduled for track strengthening. This was effected by a series of surveys and walk-over inspections by senior engineers, all items of track and associated works being scheduled, and later costed, to form a comprehensive overall programme which eventually formed the basis for detailed planning and organisation.

Earthworks

The necessity for carrying out a substantial amount of earthworks was largely occasioned by the dumping of ash and spent ballast alongside the track over many years, particularly during the changeover from ash to stone or slag ballast on many sections where the overall width was initially restricted. This practice resulted in the overloading of cutting slopes and embankment tops and, in the case of the former, tended to reduce the free overall width. Successive liftings of the track also reduced the formation width of embankments.

In many cases drainage, where provided, was inadequate and had become buried. It was therefore necessary to remove surplus material, re-establish drainage, and open out the track to admit the drying effects of sun and wind.

To provide a greater width of ballast shoulder, a modern drainage system and sufficient lateral clearance to form adequate cesses 7 ft. from running edge of rail to the bottom of a cutting slope and/or embankment edge is necessary. This distance is increased to 8 ft. where the signalling requires the provision of a cable route. The Gradall machine has been found to be the most suitable type of mechanical excavator for this class of work, having a fine degree of control exercised by the operator on the telescopic arm, which can be lowered, raised, slewed, and turned to give an excellent finished surface either to level ground or to slopes. In addition, it is safer in operation immediately adjacent to the track than a drag-line excavator which requires to be used on long slopes outside the reach of the Gradall.

Disposal of soil

Disposal of the surplus spoil frequently presents a problem. Where there are no facilities for dumping in the immediate vicinity, loading into side-tipping wagons requires to be undertaken under a track possesssion, the material being run to the nearest embankment where it can be suitably tipped to serve the dual purpose of widening and strengthening. A mutually satisfactory arrangement frequently is possible with the occupier of

Stream diversion by the "Berm" method

the adjacent land, whereby convenient access for equipment is obtained and the surplus material used for the filling-in of depressions and, where suitable, for the making or repair of cart roads.

When the nature of the work is such that it may only be undertaken from the track, it is frequently necessary to resort to work at night, under floodlights and on Sundays, when complete or part possession of the running lines may be obtained.

Where the amount of filling required is very considerable and not readily available for the widening and strengthening of an embankment slope, and could only be tipped from the running line involving track occupation, a novel method has been adopted in a few special cases. A "wet mix" wall is constructed part way down the embankment which acts as a retainer for filling material. "Wet mix" is a dolomitic limestone which has the property of setting under ordinary atmospheric conditions and when loosely tipped and consolidated will stand at a 60-deg. angle of repose as compared with ash fill at approximately 35 deg.

Stabilisation of embankments

In the past there have been many cases of slips in both cutting slopes and embankments which have been dealt with by small remedial works, or have stabilised themselves to a degree where they give comparatively little trouble but, nevertheless, require to be completely stabilised to suit modern conditions, particularly where overhead electrical equipment may be involved. Such slips are being stabilised by forming deep rubble counterforts taken down to below the slip plane with the base stepped and sealed with concrete and connected with a drain at the toe to carry away water. In addition, tapping of impounded water has been successfully accomplished by thrust borings.

An alternative method which has been resorted to is the provision of "Berm" to weight the toe of embankments, particularly in low lying areas where there is marsh land and unstable ground. A typical example of a "Berm" accompanied by a small stream diversion is illustrated.

Consideration of requirements has been greatly assisted by the formation of a well-equipped soil mechanics section.

Drainage

It is axiomatic that a pre-requisite of good track is a sound drainage system, whether this be natural or created. Unfortunately, this is an aspect which was often neglected in the past with resultant sub-standard conditions of track formation requiring uneconomic maintenance. Since the commencement of modernisation work, some 31 miles of new track drainage has been completed and a further considerable programme is envisaged. The procedure has been fully mechanised, resulting in increased rate of installation and a corresponding reduction in cost; there also is less interference with traffic.

Fully-mechanised drain-laying

A fully-mechanised drain-laying operation requiring possession of one line only and giving a rate of laying of approximately 400 yd. in a 16-hr. period is attained by the use of the mechanised drainage train. Further developments in hand make use of pitch-fibre pines in 8-ft. lengths. These have the merit of being easily handled by one man, may be sawn into any length, and fitted with flexible joints to facilitate laying.

In addition, pre-form fibreglass manhole units have been developed for use in conjunction with the pitch-fibre pipes and no crane is required for any of the operations. Preliminary trials indicate that by the adoption of units of this type, a further decrease in cost and speeding-up of laying will be achieved, the only limiting factor then remaining being the speed of operation of the trenching machine.

Ballasting

Three main differences arise in the effects on the track of the widespread use of diesel and electric locomotives as compared with steam locomotives. Firstly the distribution of the vertical static and dynamic loads through the axle arrangement gives different track-loading. Secondly, the bogie arrangements of

Pitch fibre pipes being laid for track drainage

modern, heavy and high-speed diesel and electrical locomotives supporting the rigid body construction are likely to effect the guiding characteristics and corresponding track reaction, and thirdly, wheel-to-rail contact stresses are more severe in respect of the smaller-diameter driving wheels.

To cater for these conditions, various courses of action are possible. The first is to increase the frequency of maintenance of the track support, the second to improve the stability and uniformity of the support and the third is to take steps to prevent the development of localised and very stiff support conditions.

Obviously, any increase in frequency of maintenance, which means additional costs, must be avoided, and increasing the depth of ballast between the undersides of sleepers and the surface of the natural ground is the most suitable and economical course of action, coupled with the extensive use of mechanical aids.

Progressive improvement in depth of ballast has been going on for some years, particularly in association with track renewals, but it was evident that an enhanced rate of improvement in the ballast bed support must be realised and that local weaknesses in the form of soft spots in clay formation must be treated by excavation of the saturated material and the new formation covered with an adequate depth of blanketing material.

Lifting of track

As it is cheaper to lift track than to replace it and the ballast to existing levels, it was inevitable that the longitudinal track profile would include an appreciable number of slacks occurring at overbridges where the track could not be lifted because of inadequate overhead clearances. Such slacks were frequently the site of wet places and poor formation and the policy has been adopted of reconstruction and/or lifting of overbridges to give room for the necessary track-lift, provide clearances in accordance with Ministry of Transport requirements. In addition, where electrification may ultimately follow, the additional space required for overhead electrical equipment can be provided.

The aim is to provide and maintain 12-in. of slag ballast under the sleepers of all main running lines and a greatly-enhanced rate of ballast input has been and is being undertaken. This work is facilitated by the use of the ballast-drag, on-track ballast cleaning machines, and mechanical tampers.

Design of stronger track

An essential feature associated with track development is that of providing a form of track which, in addition to removing some of the weaknesses of previous standards, requires the minimum attention in the form of a day-to-day maintenance, and of such a form that, once having been thoroughly consolidated, will remain in a satisfactory condition for very long periods, perhaps even two or three years. Such requirement is dictated by justification for the additional capital outlay involved.

In addition to the measures already described, one of the most important factors is the reduction of the effects of the new type of locomotive power on the normal type of rail joint. It has been shown that, under normal conditions in practice under dense and high-speed traffic, the peak-loading on a sleeper at a rail joint may be three times that of the average load imposed by the rail on a sleeper.

The fishbolt holes in the rail end are the origin of most rail end failures, which latter comprise some 50 per cent of the total plain rail failures. The solution to this difficulty is the welding of rails into as long lengths as practicable, reducing the number of rail joints to a minimum.

Accordingly a flash-butt rail-welding depot described in our November 14, 1958 issue, was constructed at Dinsdale, near Darlington. Here 109–110A. F.B. and 95 lb. B.H. section rails are welded into lengths of 600 ft., the output being of the order of about 1½ miles of track a week. Distribution of long-welded rails to the sites of installation is carried out by two specially equipped departmental trains of bogie bolster wagons.

In conjunction with the use of long-welded rails, the two essential requirements for stability required to be assured are, first, the security of the attachment of the rails to the sleepers which convert the rail-sleeper structure into girder form, and secondly, the frictional and other resistance between sleepers and ballast. A further requirement where provision must be made for track-circuiting is the insulation of the fastenings. These requirements have been met by the adoption of pre-stressed concrete sleepers spaced to the equivalent of 24 sleepers per 60-ft. length of normal jointed track with the rails secured to the sleepers by the "A.D." fastening assembly, a design developed on the principle of the unit clamping the rail to sleeper being in itself an insulator and the remaining components of the assembly being independent of the need for further insulation.

Insulated rail fastenings

The primary features of this type of fastening are the insulating clamping block secured by a holding-down bolt, which latter is held by a locking pin passing through the body of the sleeper, the required degree of elasticity being obtained from the use of a triple-coil spring within a retaining collar located between clamping block and securing flange-nut. The characteristics of the spring are such that, when the nut is tightened into contact with the retaining collar, a toe load is exerted on the rail foot of approximately 30 cwt. per fastening.

One of the main difficulties in securing rails direct to concrete sleepers is the anchorage of the fastening within the concrete and this has been overcome by the locking-pin device.

The general policy being pursued is to introduce, as far as practically convenient, the longest possible continuous stretches of long-welded rail rather than short isolated sections so that the full benefits of reduced maintenance demands are realised; a length of renewal of the order of three miles at one time is the extent aimed at.

Further instances of measures adopted to reduce maintenance requirements are the use of high manganese-steel insert-crossings in fast running main lines,

Ballast-drag machine consolidating slag ballast under sleepers

A typical stretch of track re-ballasted to modern requirements

complete block-unit crossings of high manganese in the new marshalling yards, and the welding up *in situ* of rail joints in the new marshalling yards with welds made by the quick thermit process.

Batteries of flange lubricators also are being fixed covering the curved groups of connections leading from the wagon retarders to reduce the sidewear of rails.

Laying of the plain line and point and crossing work forming the new marshalling yard at Newport has been the subject of close examination and application under work study which has enabled a technique to be developed, also to be applied to further constructions, whereby the very considerable mileage of track involved is laid by a labour force not exceeding 12 men, using a lorry mounted mobile crane, with consequent very small cost per mile for assembling and laying in prefabricated sections.

Realignment of selected curves

The desire to attain higher average speeds naturally has involved the examination of those sections of main routes where speed is severely restricted by curvature. Over the years progressive improvements in alignment have been made using to the maximum the space available under existing physical conditions, and any further improvement must involve shift of the lines to an extent involving the acquisition of additional land. However attractive from an engineering viewpoint a realignment may appear, justification ultimately must be decided on the advantages gained when set against the capital outlay involved in the undertaking. To set a value purely on time saved, which in any case is likely to be small over the distance involved, is both difficult and conjectural; other factors require to be considered.

Shaftholme Junction

A typical example of the foregoing is the case of Shaftholme Junction on the East Coast main line, where advantage was taken of the need for renewal of an overbridge, renewal of the junction and reconstruction of the signalbox to make a deviation in the alignment of the main line by approximately 9 ft., which enabled an existing restriction of 60 m.p.h. to be completely removed. This project was described in our January 23, 1959, issue.

Various major projects have been closely examined but have not been found financially justifiable. An appreciable number of smaller works have been undertaken involving improvement in the strength of embankments and slopes rather than the permitting of higher speeds and a typical example is on the East Coast main line between Darlington and Durham.

In addition to the civil engineering works already described, there are other developments in the nature of remodelling of layouts at existing stations and freight depots, the provision of addition facilities such as the construction and laying of the new five mile length of up independent line from Thirsk to Pilmoor, to complete four lines of way between York and Northallerton, which has been laid with 109-lb. F.B. long-welded rails on concrete sleepers, and the deviation of the main lines at Lamesley between Durham and Newcastle over a length of some two miles and to a lateral extent of approximately 150 ft., to accommodate the marshalling yard now under construction at Lamesley.

Co-operation between departments

Such works as have been described entail consultation and close collaboration with the operating departmental officers and the Chief Signal & Telecommunications Engineer, for which latter the Civil Engineer also is acting as agent in the laying of concrete cable ducts and the necessary earthworks associated therewith.

The whole procedure calls for careful and detailed planning, as most of the work affects existing lines, and must be undertaken with the minimum possession of running lines. Further, the whole of the permanent way work is being done by existing direct labour forces of a much-reduced establishment compared with that of past years and the provision and disposition of the necessary materials is of no small order.

A substantial proportion of the basic track improvement work has already been achieved but will take a period of years completely to replace existing main tracks with the new standards of design and material; much also has been learned in the process and the application of new techniques. The objects are clear, the means and knowledge are available with the application of mechanical aids which have been developed and acquired, and the permanent way aspect of the Modernisation Plan is well on the way to fulfilment.

Design and development of bogies—II

(*Concluded from page* 449)

compromise in the vertical plane (Fig. 6), while a relaxation spring in series with the damper can improve riding characteristics still further.

The effect of damper temperature on performance is indicated in Fig. 7. This should be considered when choosing dampers and their installation. Because of this it scarcely will be desirable to install dampers away from an air stream as, for example, when mounting them inside closely-wound bolster spring nests, quite apart from the obvious drawback of inaccessibility for inspection and replacement.

DEWRANCE & CO. LTD.

The formation of a Metals Division has been announced by Dewrance & Co. Ltd. It has its own board of management. The Production Executive is Mr. J. B. Morton at Hillington and the Sales & Technical Executive is Mr. E. Wallace, who is stationed in London.

PERSONAL

British Transport Commission

MR. G. DODSON-WELLS, Chief Commercial Advertising Officer, British Transport Commission, who, as recorded in our April 14 issue, has been appointed a member of the Board of Management of the British Transport Advertising Division, had a distinguished post-war career in Sales, Advertising and General Management. Before the war he was in journalism and worked successively on the Newark Herald, Derby Evening Telegraph, Continental Daily Mail,

Mr. G. Dodson-Wells

London Daily Mail, the Morning Post and The Daily Telegraph. As a Territorial he was called up in 1939 and served throughout the war, being awarded the M.B.E. for his part in the Normandy landings and the European campaign with Second British Army. In 1946 he was appointed Public Relations Officer to the London Passenger Transport Board, he became Chief Public Relations Officer in 1949, Commercial Advertising Officer to the British Transport Commission in 1953 and Chief Commercial Advertising Officer in 1956.

MR. J. B. BURNELL, Operating Manager (Central Road Services), London Transport Executive, is to retire on July 8.

MR. R. D. TAYLOR, Assistant Works Manager, Shildon, British Railways, North Eastern Region, has been appointed Works Manager, Carriage & Wagon Works, York.

MR. G. D. WILD, Mechanical & Electrical Engineering and Stores Accounts Assistant, Chief Accountant's Department, Swindon, British Railways, Western Region has been appointed Assistant Accountant.

MR. A. W. DAVIS, Assistant to Commercial Officer (Freight Terminals & Transit) British Railways, London Midland Region, has been appointed Assistant Freight Officer (Cartage & Terminals), British Transport Commission.

MR. P. D. MULHOLLAND, Projects & Development Officer, Secretary's Department, British Road Services, is to retire at the end of April.

MR. I. M. CAMPBELL, District Engineer, Kings Cross, British Railways, Eastern Region, has been elected an Associate Member of the Institute of Transport.

MR. H. W. DENHAM, Accountant, Commercial Advertising, British Transport Commission, who, as recorded in our April 14 issue, has been appointed a member of the Board of Management of the British Transport Advertising Division, is aged 52, and

Mr. H. W. Denham

is a Bachelor of Commerce, a Chartered Secretary and a Member of the Institute of Office Management. He has been associated with transport since 1924, when he joined the Underground group of companies—later London Transport. After experience in the Chairman's Office, the Statistical Office, the Secretary and Treasurer's and the Financial Departments, he was appointed Organisation and Methods Assistant to the Staff Administration Officer. In this capacity he took an active part in the formation of the British Transport Commission Commercial Advertisement Division, being subsequently appointed Accountant of that organisation from the date of its inception in March 1949.

MR. J. L. PERREN, Commercial Advertising Officer, British Transport Commission, who, as recorded in our April 14 issue, has been appointed a member of the Board of Management of the British Transport Advertising Division, was Advertisement Manager of the Sheffield Independent for seven years before the 1939–45 war, during which he served in the Royal Navy as a Lieutenant-Commander. On returning from active service he rejoined Kemsley Newspapers as London West End representative of the Daily Sketch and Sunday Graphic. In 1947 Mr. Perren joined London Transport's Commercial Advertising Department, transferring, as Head of Sales, to the Commercial Advertisement Division of the British Transport Commission on its formation in 1949. Since 1950 he has been successively Assistant

Mr. J. L. Perren

Commercial Advertising Officer, Deputy Commercial Advertising Officer and Commercial Advertising Officer of British Transport Advertising.

MR. G. A. N. HAYES, Secretary, Eastern Region Area Board, British Transport Commission, has been appointed to act as Chief Secretary to the British Transport Commission as from May 1.

MR. C. H. SWAN, A.M.I.LOCO.E., District Motive Power Superintendent, Hull, British Railways, North Eastern Region, who as recorded in our February 24 issue has been appointed District Motive Power Superintendent, Wakefield, joined the former North Eastern Railway in 1916 as a pupil of the Chief Mechanical Engineer, shortly before serving overseas with the Royal Flying Corps and Royal Air Force in the 1914-18 war. In 1922 he was appointed Technical Inspector in the Locomotive Running Superintendent's Office at York. He became Locomotive Shed Foreman at Botanic Gardens, Hull, in 1933, and moved to a similar position at Tyne Dock in 1934. He became Assistant District Locomotive Superintendent, Hull, in 1935, and, in 1944, Assistant District Locomotive Superintendent, Newcastle, a position later re-

Mr. C. H. Swan

designated Assistant District Motive Power Superintendent, Newcastle. In 1955 he was appointed Assistant to the Motive Power Superintendent, (Productivity) York and later in the same year Acting District Motive Power Superintendent, Newcastle. He was appointed District Motive Power Superintendent, Hull, in 1956, the position he now leaves.

MR. A. R. PEPPER, Assistant Divisional Shipping Manager, Dover, British Railways, Southern Region, who, as recorded in our March 17 issue, has been appointed Divisional Shipping Manager, Weymouth & Southampton, began his railway career at Harwich (Parkeston Quay). After several years in the Shipping Department he moved to the Office of the Chief General Manager of the London & North Eastern Railway at Liverpool Street in the Salaried Staff Section. After war service he returned to the Chief General Manager's office and, on nationalisation, moved to the Office of the Chief Officer (Marine) at the Railway Executive.

Mr. A. R. Pepper

Mr. Pepper became Divisional Marine Manager, Stranraer, Scottish Region, in 1952, and later, Shipping & Continental Manager, Victoria, Southern Region. He was appointed Assistant Divisional Shipping Manager, Dover, in 1960, the position he has now vacated.

MR. A. W. BEST, Assistant Works Accountant, Darlington, British Railways, North Eastern Region, who, as recorded in our March 10 issue, has been appointed to the position of Assistant to Accountant (Rolling Stock & Paybills), Darlington, was educated at Darlington Grammar School and commenced his railway service with the London & North Eastern Railway Company in 1925, in the Locomotive Accountant's Department. He was appointed an Accountancy Apprentice in 1938, and after completing his training saw service with the Royal Engineers. On demobilisation he took up a position in the Works Accountant's Office at Gorton in charge of the Works Paybill Staff. In 1949 he became Sectional

Mr. A. W. Best

Works Accountant, Darlington and, in 1954, Assistant Works Accountant, Darlington. Mr. Best is a Batchelor of Commerce, London University.

Industrial

MR. C. H. M. OWEN a Director of the Staveley Iron & Chemical Co. Ltd., and the Sheepbridge Company, has retired.

MR. J. C. BAILEY, and MR. F. L. STAFFORD, Assistant Technical Directors of the Aluminium Development Association have left for a tour of Canada and the United States.

SIR ELLIS HUNTER has retired from all executive appointments in the Dorman, Long group, including the Joint Managing Directorship of Dorman, Long (Steel) Limited. He continues as Chairman of Dorman, Long & Co. Ltd. and its principal subsidiary companies. MR. R. T. JUDGE has been appointed Deputy Chairman of Dorman, Long & Co. Ltd., and Managing Director of Dorman, Long (Steel) Limited, of which he was previously Joint Managing Director.

MR. R. W. K. BLAGBROUGH has been appointed Secretary, Electric Traction Section, British Electrical & Allied Manufacturers Association.

MR. A. A. BRUNEAU, Secretary, and MR. R. J. MOYSE, Chief Financial Officer and Treasurer, Alcan Industries Limited, have been appointed Directors of that company.

MR. A. G. M. GREZO has been appointed Sales Manager of Workington Iron and Steel Company, a branch of the United Steel Companies Limited.

MR. W. A. C. MASKELL, General Manager, Telecommunications Group, General Electric Co. Ltd., has been appointed Managing Director of the group.

MR. W. H. PETERSON has been appointed Manager, Training & Planning, the Hyster Company. MR. C. A. RICHMOND has been appointed Personnel Manager, General Office Group.

MR. I. P. M. CARGILL has been appointed Director of the Department of Operations of the World Bank. MR. A. G. KHERADJOU has been appointed Assistant Director.

MR. E. L. TOWNSEND, Managing Director of Secomastic Limited, has been elected Chairman. He is succeeded as Managing Director by MR. C. G. TUDOR POLE.

MR. E. L. MORGAN, Works Metallurgist, Workington Iron & Steel Company has been appointed Chief Metallurgist. MR. A. G. HOCK, Research Manager, has been appointed Metallurgical Consultant at Workington.

MR. R. STRICK has retired from partnership in Fendel Palmer & Tritton. MR. J. CUEREL has taken over the duties of Senior Partner. MR. F. IRWIN-CHILDS and MR. P. M. FRAENKEL have been taken into partnership.

MR. ST. JOHN DE H. ELSTUB has been appointed Chairman of the metals division of Imperial Chemical Industries Limited in succession to MR. M. J. S. CLAPHAM who has joined the company's main board as an Overseas Director.

MR. R. M. COULTAS, Manager of Transportation Sales, East Central Region, General Electric Company of Schenectady, U.S.A., has been appointed Manager of Domestic Locomotive Sales. MR. R. A. WILLIAMSON, Manager of Railroad Locomotive Marketing has been appointed Manager of Export Locomotive Sales.

DR. E. GREGORY, Director & Chief Metallurgist and MR. B. B. GREEN, Director & General Sales Manager, Edgar Allen & Co. Ltd. have relinquished the full-time executive positions and appointments they hold with the company but remain in office as "non-executive" Directors. Other executive responsibilities have been allocated as follows:—MR. W. H. HIGGINBOTHAM to be Chairman & Chief executive; MR. J. HIGGINBOTHAM, Divisional Supervision of Commercial activities; MR. W. G. A. JENKINS, Divisional

Supervision of Foundry & Steel Melting, Steel, Saw, Magnet, Works Engineering & Ancilliary Operating Services, and Operational Research; BRIGADIER A. LEVESLEY, Divisional Supervision of Marketing activities; MR. W. J. MCBRIDE, Divisional Supervision of Engineering, Trackwork, Engineer's Tools and Development & Research; MR. F. A. ROSS, Secretary & Chief Accountant; MR. W. H. EVERARD, Manager, Foundry & Ancilliary departments; MR. J. D. STUDHOLME, Manager, Engineering Department, and MR. F. HAIGH, Sales Manager.

MR. R. R. STEPHENS, Technical Adviser to the Monarch Controller Co. Ltd., has been appointed a Director of the London Engineering Co. Ltd.

MR. R. B. HESSELDEN, Works Manager, Holset Engineering Co. Ltd., is to be a Director. He is succeeded as Works Manager by MR. R. BARR.

MR. E. B. BISHOP has been appointed Secretary of Metal Cleaning Limited, a member of the Castrol group. He succeeds MR. G. J. B. WILLIAMS who has been appointed to concentrate on the company's re-organisation and sales development.

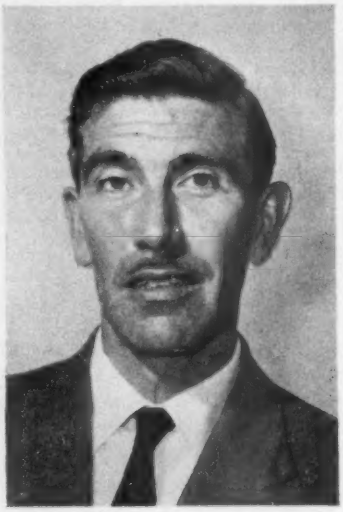
MR. N. A. C. JAMES, Southern Area Manager, Cape Insulation & Asbestos Products Limited, has been appointed Controller, Government Contracts Division, with responsibilities for liaison with the Admiralty, the Fighting Services and British Railways. He is succeeded as Southern Area Manager by MR. N. H. WIMHURST.

Overseas

MR. C. D. JAMES, head of Department of Colonisation & Agriculture, Canadian National Railways, who, as recorded in our March 17 issue, has been appointed Associate Manager, Passenger Sales Promotion, joined the Passenger Department of the C.N.R. in 1924. He moved to Montreal in 1928 and, in 1930, was transferred to the Colonisation & Agriculture Department. Mr. James became Chief Clerk in 1935, Assistant to the Director in 1949, and Superintendent of Settlement in 1957. He was appointed head of the department last year.

Mr. C. D. James

MR. J. P. LOVEGROVE, Assistant Public Relations Officer, East African Railways & Harbours, who, as recorded in our March 17 issue, has been appointed Public Relations Officer, was educated at St. Andrews College, Dublin and joined the Great Northern Railway (Ireland) in 1938. He became Assistant Advertising & Publicity Superintendent of the G.N.R. in 1948, and resigned in 1951, to take up an appointment with the East African Railways & Harbours. He became Publicity Officer in 1956, and Assistant Public Relations Officer in 1959.



Mr. J. P. Lovegrove

Institution of Locomotive Engineers

The following names have been entered on or transferred in the register of the Institution of Locomotive Engineers:

Associate Members

MR. J. H. BLUNDELL, Technical Assistant, Chief Mechanical Electrical Engineer's Department, British Railways, Southern Region.

MR. W. B. HENDERSON, District Outdoor Machinery Engineer, Chief Mechanical & Electrical Engineer's Department, British Railways, North Eastern Region.

MR. W. LOCKWOOD, Locomotive Shedmaster, Motive Power Department, British Railways, London Midland Region.

MR. R. STEVENSON-JONES, Contract Engineer, Sulzer Bros. (London) Limited.

Graduates

MR. I. N. BANERJEE, Draughtsman, Vulcan Foundry Limited, Newton-le-Willows.

MR. G. COLQUITT, Rolling Stock Training Officer, Vulcan Foundry Limited, Newton-le-Willows.

MR. B. L. SMITH, Draughtsman, Chief Mechanical & Electrical Engineer's Department, British Railways, Southern Region.

Transfer Associate Member to Member

MR. D. G. HIPPERT, Assistant Advisory Engineer, South African Railways, Trafalgar Square, W.C.2.

Transfer Graduate to Associate Member

MR. J. P. MARSON, Senior Technical Assistant (Maintenance), Chief Mechanical & Electrical Engineer's Department, British Railways, London Midland Region.

Transfers Student to Graduate

MR. J. A. CLOUGH, Assistant Training Officer (Rolling Stock), Vulcan Foundry Limited, Newton-le-Willows.

MR. A. LOVECY, Engineering Apprentice, British Railways, Eastern Region.

Institution of Works Managers

The Institution of Works Managers has elected the following as Vice-Presidents of the Institution: MR. E. J. HUNTER, Chairman, Swan, Hunter & Wigham Richardson Limited; MR. J. R. EDWARDS, Managing Director, Pressed Steel Co. Ltd.; and the HON. GEOFFREY ROOTES, Deputy Chairman & Managing Director, Humber Limited.

Institution of Railway Signal Engineers

MR. F. G. HATHAWAY, Westinghouse Brake & Signal Co. Ltd., and Senior Vice-President of the Institution of Railway Signal Engineers, was invested as President at the annual general meeting of the Institution on April 5. Editorial reference to Mr. Hathaway's presidential address is made on page 439 of this issue.

Institution of Mechanical Engineers

MR. W. KER WILSON has been awarded the 1960 James Clayton Prize by the Institution of Mechanical Engineers.

Institute of Metals

MR. R. E. MOORE has been appointed Secretary of the Institute of Metals in succession to LIEUT.-COL. S. C. GUILLAN who is to retire on April 30.

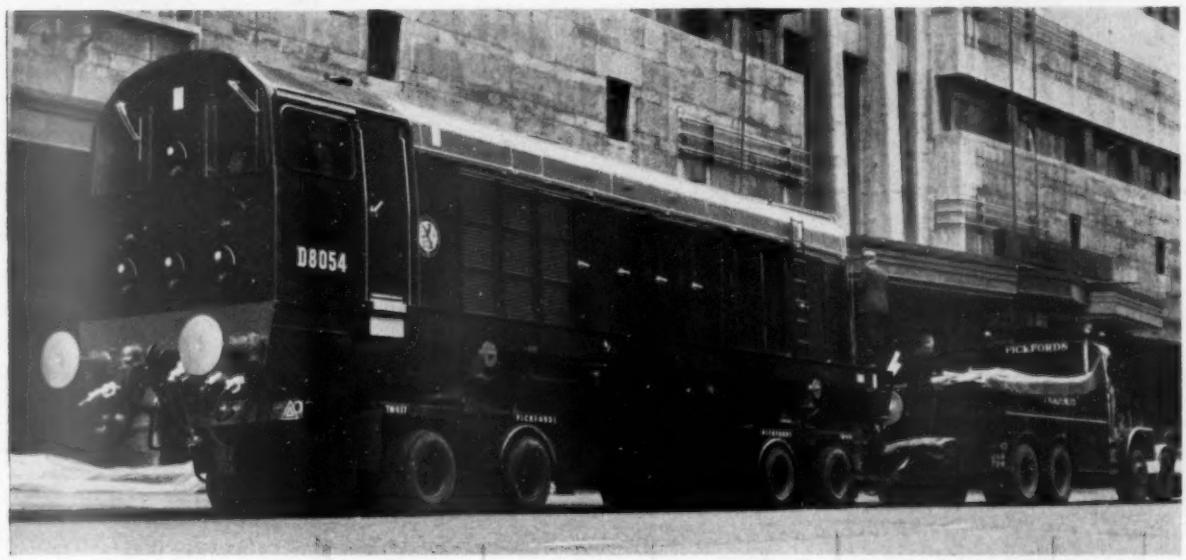
The Railway Gazette

As from April 1, MISS DAPHNE BARNES has been confirmed in the appointment of Deputy Editor of *The Railway Gazette*, in which position she has officiated for the last six months.

Obituary

We regret to record the death, on April 4, of MR. A. C. JEFFREY, Running & Maintenance Engineer, Motive Power Department, Northern Division, Inverness, British Railways, Scottish Region. Mr. Jeffrey served an Apprenticeship with the Caledonian Railway at St. Rollox, from 1914-20, and held various positions in the Motive Power Department before becoming District Locomotive Superintendent, Inverness, in 1947, a post later redesignated District Motive Power Superintendent. He became Running & Maintenance Engineer in May, 1960.

EQUIPMENT *at the Engineering Exhibition*



ENGINEERING EXHIBITION

The Engineering, Marine, Welding & Nuclear Energy Exhibition opened at Olympia on April 20 and continues until May 4.

LOCOMOTIVE

The English Electric Co. Ltd., Strand, London, W.C.2, exhibits a British Railways, Type 1, diesel-electric locomotive, of 1,000 h.p. This, seen above, was the first diesel-electric type to be delivered to B.R. under their modernisation scheme. the original unit having been placed in service in 1957. Of the total of 128 such locomotives which were ordered, some 60 have now been delivered.

AIR COMPRESSOR

Atlas Copco (Great Britain) Limited, 7 Gayford Road, London, W.12, introduce a new heavy-duty air-cooled compressor. It is said to occupy 30-50 per cent less space than conventional units of similar capacity. Requiring no specially prepared foundation, it is easily moved to another position.

LATHE

Crossley Bros. Ltd., Openshaw, Manchester, are showing a lathe capable of producing identical tapers in the bore of a valve body and on the valve plug, separately or simultaneously.

The machine, which is known as the Crossley-Beer double-ended taper-turning lathe, comprises a headstock with two independent co-axial spindles. The headstock is mounted centrally on the bed; two carriages, with cross slides and tool posts, are mounted on either side. One carriage is fitted with outside turning tools and the other with boring tools. Automatic electric sequence control is provided.

INSULATION

Chemical & Insulating Co. Ltd., Darlington, Co. Durham, shows a new precision-moulded water-resistant insulating material.

Moulded shape is unaffected by weather conditions and the material can be used satisfactorily at temperatures up to 650 deg. F.

It is supplied unmachined, but can be cut and sawn to shape and painted.

HOT ZINC BONDING

Clayton Dewandre Co. Ltd., Time & Life Building, New Bond Street, London, W.1, has introduced a new method of bonding the helical formation of iron-wire loops to the surface of mild-steel heat-exchange tubes. The two are now secured by hot-dip galvanising. The zinc provides a good bond with excellent thermal qualities and gives a corrosion-resistant surface. If necessary the bore of the tube can be kept free of zinc.

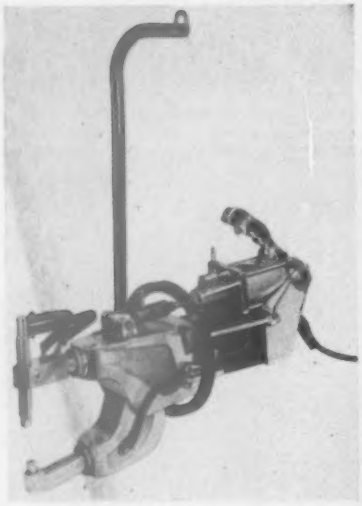
FILTERS

Birfield Limited, 20 Hill Street, London, W.1, show a number of filters, for air and oil, which have railway applications.

The oil-bath filter may be fitted into holding frames or into the cab side of diesel locomotives. It combines the rectangular design of the panel together with oil-scrubbing action, thus, it is claimed, providing continuous operating efficiency under all working conditions.

Two standard size railway filters are displayed in holding frames. The filter panels themselves are standard designs but the frames are evolved to meet the design requirements of specific locomotives.

The filter illustrated is one developed for direct connection into the lubricating system of diesel engines.



WELDING EQUIPMENT

The A.R.O. Machinery Co. Ltd., 190, Castelnau, London, S.W.13, displays it's "407" portable spot-welding gun, under operating conditions. It is a production gun, capable of spot-welding at high rates of working, and exerts an electrode force of 660 lb. at 70 lb. sq. in. when fitted with standard arms giving a working throat depth of 7 in.

Also on show will be a pedestal spot-welding machine.

SERVO-CONTROL VALVES

Among the exhibits on the stand of Dowty Rotol Limited, Cheltenham Road, Gloucester, are Moog valves. These electro-hydraulic servo control valves are extensively used in industry for applications which require extremely accurate control at high-power levels. Applications include position and speed control systems for automatic machine tools, materials handling and process control equipment, and vibrators. Although small in size, and weighing less than three-quarters of a pound, these valves can handle outputs of up to 17 h.p. and can operate at frequencies of over 1,500 c.p.s. In a flat-band region, useful power gains of up to one million to one can be achieved. Systems using these valves can control the cutting head of a machine tool, to give machining accuracies, in three axes, of not less than ·0001 ins.

FLEXIBLE HOSE

Power Auxiliaries Limited, Kembrey Street, Swindon, Wilts, exhibit various grades of "Plessiflex" stainless-steels seamless flexible hose for general industrial applications. This hose is used by British Railways for axle-box lubrication hose on certain types of locomotives, and it is specified for the "Mekhydro" transmission system on Maybach locomotives.

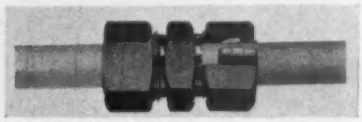
STEEL PRODUCTS

Thos. Firth & John Brown Limited, Atlas Works, Sheffield, 4, present a representative range of their products. These will include carbon and alloy-steel forgings, and rolled-steel products. The company also specialises in the manufacture of high-grade steel castings for heavy-duty wear.

FITTINGS

A range of valves, on exhibition by Saunders Valve Co. Ltd., of Cwmbran, Monmouthshire, includes a number of new types. Among these are valves for solvent welding to rigid PVC pipework, non-return valves, and chemically-resistant valves.

British Ermeto Corporation Limited, Hargrave Road, Maidenhead, Berks,



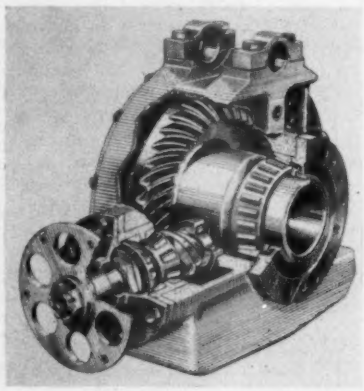
shows pipe couplings, valves, including balanced stop valves, and hoses and fittings.

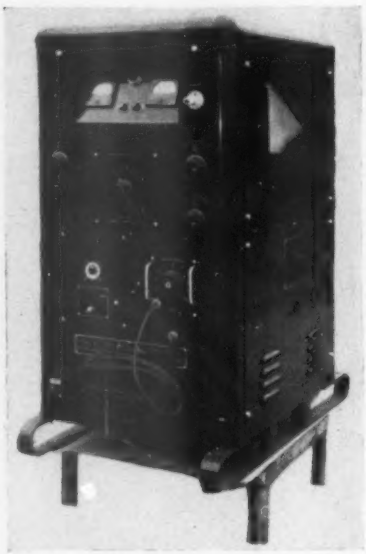
The stand of Simplifix Couplings Limited, also of Hargrave Road, Maidenhead, Berks, has on display a new coupling, for nylon tube, which uses a specially-designed olive and nut, which prevents the tube twisting when the joint is made.

AXLE-DRIVE UNIT

E.N.V. Engineering Co. Ltd., Hythe Road, London, N.W.10 has on its stand a hypoid axle-mounted drive unit for electric or diesel rail-cars, spiral-bevel gears for shunting and main-line locomotives, and precision spiral-bevel gears with ground teeth, as used for a gas-turbine locomotive.

The hypoid bevel gear unit illustrated is self-contained and intended to be pressed on the axle. In addition to providing a silent drive it permits high numerical reduction ratios to be used.





RECTIFIER

British Oxygen Co. Ltd., Bridgewater House, Cleveland Row, London, S.W.1, displays its new MRCS300 slope-controlled rectifier. With this semi-automatic electric welding of mild steel over a wide range of thicknesses down to 20 s.w.g., in any position, and even with excessive gaps, becomes possible for the first time.

The slope control is designed to control a volt/ampere curve enabling the operator to select any characteristic between constant potential and steeply drooping to suit any welding position. A closely controlled arc gives a pin-point heat source.

It is claimed that this equipment is cheaper to operate than the previous method of gas welding under similar conditions. It is also said that welding speeds are higher with no distortion.

COLLAPSIBLE CONTAINERS & HOSE

Dunlop General Rubber Goods Division, Cambridge Street, Manchester, is showing collapsible containers for transporting or storing liquids or gases.

These containers are made from nylon fabric of high tensile strength, with outer surfaces proofed with a weather-resistant Neoprene compound, the interior being lined with one of a range of natural or synthetic rubbers, depending on the liquid or vapour to be carried.

The tanks range in size from five to 50,000 gallons. When not in use they may be rolled up and stowed away in a very small space.

Dunlop Hose Division, Team Valley Trading Estate, Gateshead, displays wrapped oxy-acetylene hose, in 60 ft. lengths, and long-length braided oxy-acetylene hose.

Two-hourly Sunday service

The North Eastern Region of British Railways is to introduce a two-hourly service between York and Harrogate on Sundays from June 18 to September 10. There will be six trains in each direction and cheap day tickets will be available.

From York, diesel trains will leave at two-hourly intervals from 10.30 a.m. to 8.30 p.m., calling at Poppleton (36 minutes past the hour), Knaresborough 54 minutes past the hour), and arriving at Harrogate at 2 minutes past the hour.

The service from Harrogate to York will also be at two-hourly intervals, from 11.40 a.m. to 9.40 p.m., the trains calling at Knaresborough (47 minutes past the hour), Poppleton (3 minutes past the hour) and arriving York at 9 minutes past the hour.

The new services will be introduced experimentally and if they prove popular a similar service will be considered next year.

Dr. Beeching's appointment

The following statement has been issued by the Engineers' Guild :

The Engineers' Guild, which has many members among the chartered engineers employed by the British Transport Commission, welcomes the appointment of Dr. Beeching in the hope that this implies the recognition, by the Government, that the restoration of the British Railways to economic viability depends first and foremost on the technical success of the modernisation plan, and that the overall direction of policy is therefore best entrusted to a Chairman with a first-class technical background.

The principle, stated in the House by the Minister of Transport, that to get the best talent the country must be prepared to pay the market rate for it, is one that the Guild has been urging on the B.T.C. for over six years. During this time, in spite of repeated representations by the Guild that the salaries of B.T.C. engineers were out of line with those paid elsewhere in the profession and that, for this reason, the recruitment and retention of sufficient qualified staff for the implementation of the modernisation plan would prove difficult, if not impossible, the Commission has all along refused to see this problem as one to be dealt with, if necessary, out of the context of general salary and wage increases.

As a result of this short-sighted policy, it has in the end been forced to disclose, as the Minutes of Evidence before the Select Committee on Nationalised Industries show, that shortage of qualified staff has been a limiting factor in the modernisation plan and that wastage of such staff through resignations has been and is continuing at an alarming rate, while the Select Committee itself observed that for such staff top salaries in the middle range were some 15 per cent below the average paid elsewhere.

The Minister of Transport's statement, that the Guillebaud principle of giving railwaymen wages comparable with outside industry cannot be denied to managerial staff, appears to vindicate completely the Guild's suggestion made to the Commission last June, that an independent inquiry into the salaries of their engineering staff would be appropriate. The recent purely arbitrary salary increase of 10 per cent granted to all senior staff has not, in the Guild's view, in any way diminished the need for such an inquiry.

Dr. Beeching comes from an organisation whose attitude to and appreciation of the outlook of their qualified engineering staff is, in the experience of the Engineers' Guild, quite exemplary, and we look forward to the importation of a measure of that attitude and appreciation into the councils of the Commission and its successors where it has hitherto been unrecognised.

" Roadrailer " on show at Newcastle

Two prototype " Roadrailers "—the revolutionary trailer vehicle built to run both on the railway and on the road—will be demonstrated to Tyneside transport users by the North Eastern Region of British Railways at the New Bridge Street goods station, Newcastle, from Monday, April 24 to Friday, April 28 (both dates inclusive).

The Newcastle demonstration is part of a countrywide tour, arranged in response to the great interest which the " Roadrailer " has aroused. It will give traders an advance opportunity to see the prototypes and observe the ease with which the vehicles can be transferred from roadway to railway and vice versa.

Further tests arranged

Although the two prototypes have successfully completed thorough proving trials, further tests are being arranged to resolve the practical factors involved in using them in quantity.

Demonstrations will take place each day from 10.30 a.m. to 12.30 p.m. and 2.30 p.m. to 4.30 p.m. and will show the complete process of detaching the " Roadrailers " from a train on a railway siding, driving them off behind a British Road Services' tractor unit, and transferring them back to the railway, a process which is accomplished in a few minutes. A demonstration team composed of qualified staff from British Railways, British Road Services and the Pressed Steel Company (the manufacturers of the vehicle) will be present, who will be able to give information and answer questions where required. Two railway saloon coaches will be provided in case of wet weather to enable visitors to watch the demonstration from under cover.

Questions in Parliament

Channel Tunnel policy

Mr. John Rankin (Govan—Lab.) asked the Minister of Transport, on April 11, when he expected to announce H.M. Government's policy on the building of a tunnel connecting the United Kingdom with the Continent of Europe.

Mr. Marples said the matter continued under close study, but he could not say when an announcement would be made.

British Transport Docks

Mr. J. M. Coulson (Kingston-upon-Hull—Con.) asked the Minister what consideration he had given to the proposal that British Transport Docks should come under the control of local dock and harbour authorities operating along the lines of public trusts.

Mr. Marples said in a written answer that he was considering representations made to him on this point. The Government's present intentions were to set up a statutory Docks Board on the lines indicated in Cmnd. 1248.

Weed Sprays on Railways

Mr. John Farr (Harborough—Con.) asked the Minister of Transport, on April 12, if he would issue a general direction to the British Transport Commission that, this year, when weed spraying on the railways, non-toxic sprays be used.

Mr. Marples refused. He said that British Railways used only non-toxic weed killer and that no change in this respect was envisaged.

Sunday Rail Fare

Mr. Roy Mason (Barnsley—Lab.) asked Mr. Marples, on April 13, if, because of the many diversions and late arrivals of main line trains on Sundays, he would issue a general direction to the British Transport Commission to consider a cheaper single fare ticket for Sunday use.

Mr. Marples refused to do so.

Parliamentary Notes

Export credit for railway projects

Mr. Reginald Maudling, President of the Board of Trade, announced in the House of Commons on April 12 new and extended facilities under the Export Credits Guarantee Department, designed to facilitate the sale abroad of large capital projects costing not less than £2 million (excluding local expenditure). Examples were power stations, pipelines, industrial undertakings, railway projects, and possibly harbours and dams. One of the conditions of reduced premium for long-term credit would be that there would have to be strong commercial grounds for gaining the contract and that it would be a stimulus to an industry short of orders.

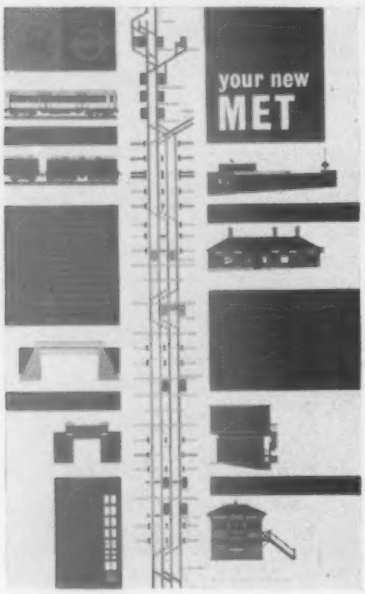
The Department had designed a simplified " Small Exporter " guarantee which would be available from May 1 to all exporters who had not exceeded £10,000 export turnover per annum in recent years.

Centenary display

The London Transport Executive is celebrating a local centenary—the opening of George Francis Train's " Westminster Street Railway "—by a small display in the entrance to its headquarters offices at 55 Broadway, Westminster, S.W.1 (St. James's Park Station). The display was opened on April 15, a hundred years after Train's horse-car, " The People," made its first journey between Westminster Abbey and Victoria Station along Victoria Street, then a comparatively new thoroughfare less than ten years old. Contemporary accounts described the route as between " Westminster Abbey and the Pimlico railway station." The four-wheel car, which had its name in foot-high letters along the side, carried only 24 passengers, all inside. A second car, to carry 48 passengers inside and out, was promised " within a few days," but failed to appear. The fare for the journey was 2d. at first, but was later reduced to 1d. The car shed and stable were on a

site on the north side of Victoria Street about halfway between what are now Dean Farrar Street and Broadway.

LONDON TRANSPORT EXECUTIVE POSTER



Poster showing new tracks, stations, and buildings under construction between Harrow and Rickmansworth on the Metropolitan line

Paper on British Railways Modernisation Plan

Mr. K. A. Kindon, Traffic Manager (Tees-side), British Railways, North Eastern Region, read a paper on the Progress of British Railways Modernisation Plan at an Open Forum at West Hartlepool on March 22. The paper dealt with the need for modernisation, the main features of the plan, and the problems associated with its implementation. The achievements and benefits already obtained were also outlined.

North Eastern Region schemes

Included in the paper were descriptions of major schemes in the Tees-side area relating to motive power depots, diesel depots, marshalling yards, passenger and goods stations, and signalling installations.

Rationalisation of facilities

The paper explained the need for rationalisation of rail services and facilities and illustrated the conditions governing the closing of branch lines and stations, the introduction of diesel services, and the attention given to the economic use of capital equipment by reduction in numbers of locomotives and rolling stock. Economies following relief from statutory obligations such as the provision of manned gates at level crossings were also taken into account.

The conclusion reached was that the Modernisation Plan, as shown in the 1959 re-appraisal, was basically sound and that there was a need to spend money to provide a modern railway system to replace that which had become out of date from lack of capital expenditure over many years. The objective was a modern progressive undertaking concentrating on the tasks for which railways are best suited, and the elimination of those elements which were not necessary to the fulfilment of those tasks, with a small staff, proud of their industry and better paid.

Staff & Labour Matters

Provincial bus workers' pay claim

The Trade Unions on the employees' side of the National Joint Council for the Omnibus Industry have decided to refer their rejected claim for improved rates of pay and conditions of service to arbitration.

The Ministry of Labour has been asked to appoint an Independent Chairman to a tribunal, two other members on which will be appointed by the Omnibus Companies and the Trade Unions.

It is expected that the findings of the arbitration board which has now completed its hearing of a claim in respect of municipal bus and tram workers will be issued before a decision in connection with the claim for provincial bus workers is reached.

Rebuilding at Hayes & Harlington Station

The Western Region of British Railways is to rebuild the booking office at Hayes & Harlington Station to modern design, and work has already begun.

The existing office, which is inadequate to handle present-day traffic, is being completely demolished. It will be replaced on the same site with a new building containing a booking hall, mechanised ticket office, inquiry lobby, and staff quarters. This new structure will be erected on a concrete raft over the line. Bicycle accommodation will be provided alongside the station.

The scheme forms part of British Railways Modernisation Plan and was developed in the office of the W. R. Architect under the direction of the Chief Civil Engineer, Mr. M. G. R. Smith.

New signalling at Newport

Four-aspect colour-light signalling was brought into use by the Western Region of British Railways between Newport and Magor on Sunday, April 16. All connecting points are worked by electric power, and the four tracks between the two towns are rearranged to allow for alternate running.

The newly-built fly-over at Bishton carries the Up relief line over the Up and Down main lines. This gives access for freight trains to the Up-side marshalling yard at Severn Tunnel Junction without interfering with passenger trains running on the main lines.

Three signal control panels in existing boxes control the scheme—the boxes at Llanwern and Lliswerry no longer being required.

This is the first stage of a scheme under which the whole area from Bishton to Marshfield on the main South Wales line to Llantarnam on the Hereford line will be controlled from Newport.

Sheffield travel agents meet railway officials

At a meeting under the chairmanship of Mr. R. A. Savill, District Commercial Officer, Sheffield, Eastern Region, British Railways, in the Royal Victoria Hotel, Sheffield, local travel agents met officers of the Eastern Region to discuss mutual problems.

It was revealed that traffic receipts at the

WESTERN REGION PUBLICITY

Six-colour posters by Fleming & Humphreys Limited issued by the Western Region

agencies concerned showed an increase during 1960 of about 6 per cent compared with 1959, despite the very poor weather conditions prevailing for most of the summer. Agents considered prospects to be good and some reported increased bookings during the present year.

All-in holidays to Scotland and the Isle of Man were discussed and results, compared with the previous year, showed an increase to both holiday areas. Good weather in Scotland last summer had influenced this. The facilities again apply in 1961 and current bookings are up.

It was announced that a new sleeping car service will commence operating from Sheffield in June this year. This will be provided by the 1.07 a.m. train between Sheffield and Newcastle from Tuesdays to Fridays, and by the 11.26 p.m. train from Sheffield to Bristol from Mondays to Thursdays.

Other subjects discussed included the development of inclusive holiday tours, visits by agents and staffs to railway departments to view new equipment, sampling of new facilities, agents' publicity material, and various suggestions for the improvement of train services.

CONTRACTS & TENDERS

British Railways, Eastern Region, has placed the following contracts :

H. Richardson & Son Ltd.: construction of two-storey building for technical departments on south side of Salisbury Avenue, Barking

United Steel Structural Co. Ltd.: supply and delivery of steelwork for the reconstruction of underline bridges No. 52, 65 and 69, between Warsop (Goods) and Boughton (Goods)

Vickers - Armstrong (Shipbuilders) Limited : annual overhaul and survey and the sheathing of after train deck of mv. *Norfolk Ferry*

Thomas Fletcher & Co. Ltd.: construction of reinforced concrete invert at bridge No. 98 between Chesterfield and Whittington

Wellerman Bros. Ltd. : removal of bridge No. 1, between Stairfoot North Junction and Grimesthorpe Colliery

Petbow Limited : supply and delivery of two 50 kVA mobile diesel alternator sets

R. G. Carter Limited : provision of carriage cleaners accommodation at Yarmouth Vauxhall station

W. & C. French Limited : extension of Up platform construction of curtain wall, demolition of redundant structures and ancillary works at Stepney East Station

Demolition & Construction Co. Ltd. : demolition of warehouse, alterations of existing accommodation to provide an office and construction of sack store at Gainsborough Central Station

Vickers - Armstrong (Shipbuilders) Limited : annual overhaul and survey and sheathing of after train deck of mv. *Suffolk Ferry*.

British Railways, London Midland Region, has placed the following contracts:

Northern Taroads Limited: tarspraying and road repair programme for 1961 in the Lancaster and Blackburn districts

J. Rata & Co. Ltd.: repairs to roofs of fruit shed and paper shed at Curzon Street Goods Depot, Birmingham

Taroads Limited: tarspraying and road repair programme for 1961 in the Walsall and London districts

Rowells Limited: heating, cold water, and ventilation at the diesel servicing shed in the new marshalling yard, Carlisle

Trinidad Lake Asphalt Co. (North Western) Ltd.: platform resurfacing at Mossley Hill, Allerton, and Ditton Junction Stations

Ratcliffe & Ratcliffe Limited: improvements to booking offices and platform buildings at Willesden New Line Station

Constable, Hart & Co. Ltd.: tarspraying and road repair programme for 1961 in the Derby North District

Butterly Co. Ltd.: supply, fabrication and delivery of steelwork, etc., for bridge No. 10 on the Aston-Sutton Coldfield line; bridges No. 6, 34, and 38 on the Sutton Coldfield-Lichfield line; bridge No. 49 on the Stour Valley line; bridge No. 89 on the Chester-Holyhead line, and bridges No. 156 and 164 on the London-Bedford line

W. H. Jones & Sons Ltd.: construction of new signalbox at Coventry Station in connection with London Midland Region modernisation and electrification scheme

J. Tildesley Limited: supply, fabrication, and delivery of steelwork for bridge No. 17 on the Birkenhead-New Brighton line

Mullen & Durkin Limited: construction of Staff Association club building at Rosegrove

Davis, Watson & Elliotts Limited: platform resurfacing at Mossley Hill, Allerton and Ditton Junction stations in connection with London Midland Region modernisation and electrification scheme

R. Partington & Sons Ltd.: construction of Staff Association club building at Patricroft

Edwin Fox & Co. Ltd.: construction of Staff Association club building at Wigston.

Thomas Smith & Sons (Rodley) Ltd. has received orders for nine excavators: four Smith " 12 " excavators and five Smith " 21 " excavators from Bankes & Lovelace Limited of London, its main agents for Switzerland.

BOARD OF TRADE

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Egypt :

Supply of welding materials.

The issuing authority is the Purchases & Stores Department, Railway Building, Shoubra Subway, Cairo, to which bids should be sent. The tender No. is E.R.336-G.8/240. The closing date is May 6, 1961. The Board of Trade reference is ESB/12431/61. No further information is available at the Board of Trade.

Supply of rivet mild steel.

The issuing authority is the Purchases & Stores Department, Railway Building, Shoubra Subway, Cairo, to which bids should be sent. The tender No. is E.R.303.G.8/552. The closing date is May 13, 1961. The Board of Trade reference is ESB/12432/61. No further information is available at the Board of Trade.

Electrification of signalling on Alexandria-Sidi Gaber line.

The issuing authority is the Materials & Supply Department, Way & Works Department, Egyptian Republic Railways, Ramses Square, Cairo, to whom bids should be sent. The closing date is September 2, 1961. The Board of Trade reference is ESB/11812/61. No further information is available at the Board of Trade.

From Korea :

692 tyres, locomotive, driving, trailer, tender and car.

The issuing authority is the Director, Office of Supply, Government of the Republic of Korea, Seoul, to whom bids should be sent. The tender No. is KFX-79. The closing date is May 2, 1961. The Board of Trade reference is ESB/11887/61.

From Burma:

5 2,000 b.h.p. diesel locomotives and spare parts

45 1,000 b.h.p. diesel locomotives and spare parts.

The issuing authority is the Chairman, Union of Burma Railway Board, Rangoon, to whom bids should be sent. The closing date is May 31, 1961. The Board of Trade reference is ESB/11857/61.

From Pakistan :

6,000 rft. pipes M.S., galvanised with sockets 4 in. bore to PRSS No. W/3/49.

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P6/F1/19/61. The closing date is May 1, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/12810/61.

20 Kardex steel cabinets.

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P4/GB11/171/56. The closing date is May 6, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/12812/61.

146 tons of ticket boards, 27½ in. x 38 in., 360 lb. (500 sheets) 34/36 gauge as per specimen. (Sample to be submitted along with the quotation.)

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P4/GB11/Offer/60. The closing date is April 29, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/12813/61.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

NOTES AND NEWS

Institute of Transport informal luncheon. Owing to the indisposition of Mr. T. G. Gibb, the Institute of Transport informal luncheon, arranged for April 25, at the Connaught Rooms, has been cancelled.

Change of name. Colloidal Graphite Limited is to change its name, from May 1, to Susgra Limited. The address remains unchanged, Sheaf Island Works, Pond Hill, Sheffield 1, telephone 27397.

Change of address. Thomas Bolton & Sons Ltd. has transferred its Birmingham Sales Office to Lichfield with a new address at 7 Market Street, Lichfield, Staffordshire, telephone Lichfield 3632.

Bluebell line reopened. The Bluebell Line stretching from Sheffield Park to Horsted Keynes, Sussex, which last year was bought from British Railways for preservation, was officially reopened on April 1.

New district control. The North Eastern Region of British Railways has brought into operation a new District Control at Newcastle Central Station to supervise rail movements throughout Northumberland and most of Durham.

Lunch to Mr. C. M. Hannoyer. A luncheon will be held on Thursday, May 11, at the Carlton Tower Hotel to Mr. Claude Hannoyer, General Manager & General Agent of the French Railways Limited, who is returning to Paris. Tickets, price 37s. 6d. each, including presentation, may be obtained from Mr. Shirley H. James, 4 West Halkin Street, S.W.1.

New layout for London Midland Region magazine. The March issue of the London Midland Region magazine incorporates a new layout with article headings in Regional colours. In addition to the usual features, a short story and a page of humour have been included. The whole impression is one of brightness and colour.

Longer London buses. The London Transport has ordered 24 30-ft. Routemaster buses, which will seat eight passengers more than the standard 27½ ft. vehicle, to try out higher capacity buses under Central London conditions. Delivery will commence in June.

Walton Station closure. Walton Station, between Normanton and Royston & Notton is to close from June 12. Alternative facilities for passengers will be provided by the West Riding Automobile Co. Ltd. Parcels traffic will continue to be dealt with as at present.

Derailment at Pitsea. Two people were killed and 49 injured when engine of the 12.25 p.m. steam train from Fenchurch Street to Shoeburyness overturned after running over catch-points shortly after 1.30 p.m., on April 18. Passengers were trapped in the leading coach which telescoped over the back of the engine, the second coach, which reared up over the first, was badly smashed, but the third coach, although derailed, was comparatively untouched.

Collision at Waterloo. On April 11, an electric train from Epsom to Waterloo was involved in a head-on collision with a light engine travelling tender-first just outside Waterloo Station, Southern Region, British Railways. The motorman of the electric train died, and 12 passengers were taken to hospital. Four of the casualties were kept in hospital for observation and x-ray for suspected fractures; the remainder were treated and sent home. The driver of the steam engine and his fireman were uninjured.

The Euston Players. On April 14 and 15, the Euston Players, British Railways, L.M.R. (London) Dramatic Society, presented at the Rudolf Steiner Theatre, Park Road, Baker Street, N.W.1, "Bonaventure," a play by Charlotte Hastings. It concerns the case of Sarat Carn, an artist, who is convicted for the murder of her brother, and while being taken from the Central Criminal Court to Norwich, Miss Carn and her escort are forced to take shelter from floods in the fen country in a convent, where she is befriended by Sister Mary Bonaventure, who believes her to be innocent and sets about proving it. The part of Bonaventure was played with sympathy and understanding by Beckie Pass, and Peggy Kirby gave a most convincing performance as the condemned Sarat Carn. John Ahern was excellent as the rather simple Willy Pentridge, and also good in their respective parts were Rita Smith as the Mother Superior, Joyce Cordery as Sister Josephine, and Arthur Lloyd as Dr. Jeffreys. The play was produced by Jack Pegg.

Discussion courses for Stationmasters. The North Eastern Region of British Railways is holding a series of courses for stationmasters at which practical problems which stationmasters are having to cope with are informally discussed. The illustration which appears on this page shows stationmasters: J. Hugill, Pilmoor; H. G. Thompson, Tadcaster; G. S. Naylor, Luddendenfoot; R. W. Carr, Stainton Dale; F. Dale, Poppleton; T. Elgey, Askern; R. Pollard, Ferrybridge; J. G. Newton, Earswick; assistant stationmaster R. K. Edwards, York, and relief stationmasters W. N. Atkinson, G. E. Hall, and W. H. Johnson.

Bus and coach alterations in Rickmansworth. Because a permanent one-way traffic scheme was being introduced in Rickmansworth town centre on April 16, all but one of the bus and coach routes serving the town were re-routed from that date. The eastern part of High Street (from Park Road to Station Road) is for westbound traffic and the western part (Uxbridge Road to Station Road) for eastbound traffic; all traffic then proceeds northwards *via* Station Road past Rickmansworth Station. As a result of these diversions, alterations have been made to bus and coach stopping arrangements. Notices, giving details, are being displayed on all stops affected.

Industrial & Factory Law. A course of lectures on Industrial & Factory Law will be given by Mr. Harry Samuels, under the auspices of the Industrial Welfare Society, at their headquarters, 48, Bryanston Square, London, W.1, May 9-11. The course covers the legal groundwork necessary to industrial managers and executives, and in view of recent important legislative changes in this sphere, is also intended as a refresher course. Further particulars may be obtained from the secretary of the society.

Holiday period tickets. The North Eastern Region of British Railways has announced that holiday period tickets at reduced fares (second class only) will be available from stations in the West Riding of Yorkshire to Bridlington, Scarborough and Whitby during the period May 5 to September 30, except at the "peak" weekends July 28 and 29, August 4 and 5 and August 11 and 12. This

Stationmasters discussion course in progress at York, North Eastern Region, British Railways

new facility gives a saving of approximately 5s. in the pound. Passengers may travel by any train on Fridays and Saturdays and the return journey can be made any time within the following 14 days. The new facility is not available for travel to intermediate stations, nor will break of journey " en route " be permitted.

" A Month of Sundays." Last week at the Scala Theatre, London, the Southern Railway Dramatic Society presented a comedy, " A Month of Sundays," by Gerald Savory, to a large audience which was appreciative of the high standard which has come to be associated with the work of this Society. The parts of Mr. and Mrs. Sylvester were played by Mr. Bernard Murray and Miss Gwen Drake, and those of the three daughters by Miss June Ernest, Miss Lilian Thomas, and Miss Joy Madge. Tim Riley was excellently portrayed by Mr. David Jones, and Mr. Ronald Varney gave a good all-round performance as Major Twomely-Bickford.

New station at Moor Park. Moor Park new station will be opened on April 23. Built in connection with the London Transport Executive's modernisation scheme for the Metropolitan line, the new station will have, when finished, a subway leading to two island platforms, raised roof and window lights over the ticket hall, and a cedarwood and mosaic front. The interior walls and floors will be tiled, and the entrance porch will have a wood lined ceiling.

Temporary alterations to train services. Engineers will be reconstructing a rail bridge across the Leeds–Liverpool Canal at the west side of Leeds City Station from April 23 to May 14 (inclusive), and as a result certain trains to and from Leeds City Station will be retimed, and platform arrangements altered during this period. No trains will leave Leeds City Station earlier than at present advertised, except for the 6.43 a.m. (Sundays excepted) Leeds City to Manchester Exchange which will leave at 6.38 a.m. Normal connections will be maintained at Leeds. Revised departure sheets will be exhibited at Leeds City and Central Stations showing the altered timings and platform numbers. Blackboard notices will also be exhibited at other affected stations giving details of the altered timings.

Withdrawal of passenger train service. The passenger train service between Bury St. Edmunds and Long Melford on the Eastern Region of British Railways, has been withdrawn. Intermediate stations at Lavenham, Cockfield and Welnetham are closed to passengers. Facilities for freight and parcels traffic continue to be available at Lavenham and Cockfield, but Welnetham Station has been reduced to a public siding for handling freight traffic in full wagon loads.

Cowdenbeath Passenger Station. Cowdenbeath Station, Fife, which has been rebuilt under the modernisation programme, was opened recently by Mr. S. R. Paterson, Town Provost. The " Up " platform has a ticket hall, ticket & parcels office, stationmaster's office, waiting room, ladies' waiting room and lavatories. There is a glass facade to the platform and ticket hall. The ticket office is equipped with Bellmatic and Ultimatic ticket issuing machines and hygiaphone ticket windows. On the " Down " platform there is a waiting shelter, porter's room, foreman's room, station store, and parcels store. Modern electric lighting has been installed and central heating is provided by a gas-fired boiler. A picture will be found elsewhere on this page.

Hindley Green, Platt Bridge, and Caton Stations. The London Midland Region of British Railways has announced that Hindley Green and Platt Bridge Stations between Wigan and Manchester, and Caton Station between Lancaster and Wennington are to close on May 1. Passengers for Hindley Green or Platt Bridge may book to Wigan, Tyldesley or Hindley South and continue their journey by bus. Parcels and passenger train merchandise will be dealt with at Wigan. Caton passengers should book to Lancaster, thence by bus. Parcels and passenger train merchandise will be dealt with at Lancaster, and freight traffic at Lancaster (Castle) or Hornby. Traffic for private sidings will still be handled at Caton.

" Out-of-gauge " load of steel. North Eastern Region of British Railways arranged for a special freight train to convey 12 out-of-gauge lattice cross girders, measuring up to 48 ft. x 11 ft. 10 in. x 3 ft. 11 in. from Cleveland Bridge & Engineering Co. Ltd., at Darlington, for use in the construction of the Tamar Suspension Bridge. The bridge is being built across the River Tamar near Brunel's famous Royal Albert Railway Bridge and will carry the main road from Plymouth in Devon to Saltash in Cornwall. Altogether, more than 2,400 tons of steelwork for the new bridge is being carried by rail from Darlington. The girders were loaded by an overhead Goliath crane to bogie-bolster wagons, one girder to each vehicle, at the company's private sidings.

Conversion of Kipling Cotes Station. Kipling Cotes Station, between Market Weighton and Beverley, on the North Eastern Region of British Railways, is to be converted to an unstaffed halt for passengers, and a public delivery siding for goods, from June 12. Passengers will be required to book their tickets at their destination or, if they are travelling long distances, at the first intermediate changing point. Parcels traffic by passenger train, and small consignments of freight traffic for traders will continue to be dealt with by road vehicles from Beverley. Members of the public wishing to despatch consignments, may either hand them to the driver of the Beverley vehicle or take them to Market Weighton Station. Freight traffic in full wagon loads will be dealt with at the public delivery siding by arrangement with the Stationmaster, Market Weighton.

Emu Bay Railway Co. Ltd. Mr. A. D. J. Forster, Chairman of the Emu Bay Railway Co. Ltd., in his report to shareholders circulated with the accounts to December 31, 1960, recalls that last year he mentioned that replacement of main-line steam locomotives by diesel engines had been decided, but orders had not yet been placed with locomotive manufacturers pending completion of a survey of future traffic requirements and current discussions on long-term freight rates with the railway's principal customer. After protracted negotiations an agreement had been entered into with the Electrolytic Zinc Company providing for freight rates which ensured the railway company being reimbursed for the total capital cost of three new locomotives and spare parts within five years if the haulage contract were not extended, or during ten years if it was. These amortisation payments would be made irrespective of the amount of traffic. The balance of the freight charge was planned to take into account any changes in economic conditions. As soon as practicable after completing the agreement the directors placed an order with Tulloch Limited, of Rhodes, New South Wales, for three diesel-hydraulic locomotives which would weigh about 50 tons each, carried on two four-wheel bogies. These new power units matched the existing steam engines in traction and speed characteristics; three of them will handle the annual tonnage now hauled by six steamers, and they would have fewer wheels, axles, and axleboxes to be maintained, with a reduction of locomotive tonnage from 120 tons to 50 tons.

New buildings at Cowdenbeath passenger station, British Railways, Scottish Region

Railway Stock Market

Now the Budget is out of the way, the assumption in the City is that stock markets will become increasingly active, because of the optimistic views prevailing about the world trade outlook and the scope for growth in export business. The buoyant mood of Wall Street is also continuing to help sentiment.

Compared with a week ago, Canadian Pacifics have risen afresh from $44 to $45½, while the 4 per cent debentures at 58¼ and 4 per cent preference stock at 59½ were virtually maintained on balance. At their current level, Canadian Pacific shares yield nearly 6 per cent, which must be regarded as attractive for the long-term investor, bearing in mind the company's progressive policy. The annual report says that notwithstanding current economic difficulties, the board feels that there is no ground for lack of confidence in the future, and the foundations for long-term benefits continue to be laid by a continuing high level of capital outlay. White Pass shares at $10¼ eased slightly compared with a week ago.

The Cuban news had no effect on the quotation for United of Havana second income stock at 6½, and in other directions, International of Central America common shares remained at $22½, though the preferred stock dropped from $119½ to $112½.

Costa Rica ordinary stock, reflecting some selling, came back from 41½ to 39½, while the first debentures lost a point at 96½, though the second debentures were maintained at 125, but quotations were scarcely tested by business.

Mexican Central "A" bearer debentures were again 61, Guayaquil & Quito assented bonds 52½, and Chilean Northern first debentures 50. Brazil Railway bonds were 4½, and San Paulo Railway 3s. units came back from 1s. 2½d. to 1s.; so far this year their extreme levels have been 10½d. and 1s. 8½d. Paraguay Central prior debentures changed hands up to 18.

Antofagasta ordinary stock remained at 16½, but the preference stock eased from 35 a week ago to 34½; the 4 per cent perpetual debentures were 45½.

Nyasaland Railways shares kept at the lower level of 11s. recorded a week ago; and the 3½ per cent debentures at 33½. Midland of Western Australia ordinary stock was again 8½. West of India Portuguese capital stock remained at 117½ and Barsi Light Railway at 17.

Although slightly lower on balance at 7s. 10½d., compared with 8s. 1½d. a week ago, Beyer Peacock 5s. shares have been steady on satisfaction with the results which were regarded as a good achievement in the conditions ruling. Charles Roberts 5s. shares rose from 8s. 3d. to 9s., and Birmingham Wagon at 28s. 6d. were quite well maintained on balance and more active because of a revival of take-over rumours. Elsewhere, North British Loco. have risen on balance from 7s. 9d. to 9s. 3d. Wagon Repairs 5s. shares moved from 19s. to 19s. 10½d. and Gloucester Wagon 10s. shares have been maintained at 10s. 6d. Westinghouse Brake gained 9d. at 41s. 9d.

Dowty Group 10s. shares were little changed at 40s. 3d., while Pressed Steel 5s. shares moved from 31s. 9d. to 32s. 4½d., but B.I.C.C. fell sharply from 58s. 4½d. to 55s. 3d. awaiting news of the terms of the proposed issues of debentures and shares to raise about £15,000,000 announced with the preliminary results and maintained 13½ per cent dividend. In electricals, A.E.I. were good, having risen on balance from 44s. 6d. to 47s. 3d., while English Electric at 37s. 6d. have been quite well maintained on balance, as have G.E.C. at 37s. 9d.

Vickers eased to 33s. in advance of the results, and British Oxygen 5s. shares at 34s. 3d. were also slightly down on balance at 34s. 3d. Ransome & Marles 5s. shares held firm at 23s. 6d. and Pollard Bearing 4s. shares strengthened to 41s.

Forthcoming Meetings

April 22 (*Sat.*). The Stephenson Locomotive Society, High Peak rail tour.

April 24 (*Mon.*). The Institution of Railway Signal Engineers, Bristol Section, at Bristol Temple Meads Station, at 6 p.m. Annual general meeting.

April 26 (*Wed.*). The Institution of Electrical Engineers, Electronics & Communications Section, at Savoy Place, London, W.C.2, at 5.30 p.m. "Data transmission," Mr. R. H. Franklin, and Mr. J. Rhodes.

April 26 (*Wed.*). The Institution of Mechanical Engineers, at 1, Birdcage Walk, London, S.W.1, at 6 p.m. Annual meeting.

April 26 (*Wed.*). The Institution of Mechanical Engineers, at 1, Birdcage Walk London, S.W.1, at 6 p.m. Annual report of the council.

April 27 (*Thu.*). The Institution of Mechanical Engineers, Steam Plant Group, at 1, Birdcage Walk London, S.W.1, at 6 p.m. Discussion on "Acid cleaning as applied to steam power plant."

April 27 (*Thu.*). The Permanent Way Institution, Nottingham & Derby Section, at the Victoria Station Hotel, Nottingham, at 6.30 p.m. "Some track maintenance problems," Mr. F. Fawcett.

April 27 (*Thu.*). The Model Railway Club, at Keen House, Calshot Street, Kings Cross, N.1, at 7.45 p.m. "Scotland 1959-60," Mr. J. J. Davis.

April 28 (*Fri.*). The Railway & Canal Historical Society, West Midlands Group, at the Engineering Centre, Stephenson Place, Birmingham, 2, at 7.15 p.m. Film show.

April 29 (*Sat.*). Railway Correspondence & Travel Society, East Midlands Branch, Vale of Belvoir tour. Special train leaves Nottingham Midland at 1.40 p.m.

May 3-4 (*Wed.-Thu.*). Railway Modernisation Conference. Joint conference with the Institution of Electrical Engineers, the Institution of Civil Engineers, and the Institution of Mechanical Engineers, at the Institution of Civil Engineers at Great George Street, London, S.W.1.

OFFICIAL NOTICES

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invite applications for the following positions:

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SENIOR & JUNIOR PRODUCT ENGINEERS, with H.N.C. minimum, to join a newly formed Product Engineering Group. Applicants should have a broad engineering background, preferably with some design experience. Applications should be sent giving brief details of age, qualifications and experience, to Personnel Manager, Serck Radiators Limited, Warwick Road, Great, Birmingham, 11.

TRAFFIC REGULATOR/YARD MASTER required for American Mining Corporation operating Railway at high altitude in Peru. Minimum five years' experience Railway Traffic Department. Age, 30/40 years. Initial contract, 33 months with passages paid. Starting salary, U.S. $450/500 per month. Box 156, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

IMPERIAL COLLEGE: Bursaries available for one year course in Electric Traction from October, 1961. Candidates should preferably hold Honours degree in Electrical Engineering or qualifications of equivalent standard and have intention and possibility of working in the British transport or associated manufacturing industries. Value £400 with higher rates for industrial experience. Applications, by letter, not later than August 31st to Registrar, Imperial College, London, S.W.7, from whom further details may be obtained.

CENTRAL ELECTRICITY GENERATING BOARD

TRANSPORT OF FUEL SUPPLIES TO POWER STATIONS

SENIOR ASSISTANT required in the Fuel Supplies Branch of the Operations Department at Headquarters, London, E.C.1.

The successful candidate will assist the Transport Officer responsible for the national co-ordination of the transport of fuel to power stations.

Candidates should possess a degree in Economics, or have passed the requisite examinations for Corporate Membership of the Institute of Transport, and preferably have a good working knowledge of industrial transport.

●Salary within the range £1,200—£1,290 per annum.

Applications stating age, qualifications, experience, present position and salary to the Appointments Officer, 24/30, Holborn, London, E.C.1, by May 1.

Envelopes should be marked "Confidential Ref. R.G./109."

RHODESIA RAILWAYS

CLOSURE OF RHODESIA RAILWAYS' LONDON AGENCY

NOTICE is hereby given that the Rhodesia Railways' London Office at 241, Salisbury House, London Wall, London, E.C.2, will cease to operate after the 30th June, 1961.

Communications which have in the past been addressed to the London Agent at the above address should henceforth be sent to

The General Manager,
Rhodesia Railways,
Post Office Box 596,
BULAWAYO, Southern Rhodesia

unless the subjects are current and communication with the London Agent up to the 26th June, 1961, will avoid delays in disposing of such matters.

With the closure of the London Agency, overseas purchases of Stores and Materials will be arranged from Bulawayo by

The Chief Supplies Officer,
Rhodesia Railways,
Post Office Box 1999,
BULAWAYO, Southern Rhodesia

who will take over the procurement functions of the London Agent, that is, invitations to tender and placing of orders, etc. Details of the new purchasing procedure will be clearly shown on tender forms and other documents.

General Manager's Office,
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BULAWAYO, S. Rhodesia.
14th April, 1961.
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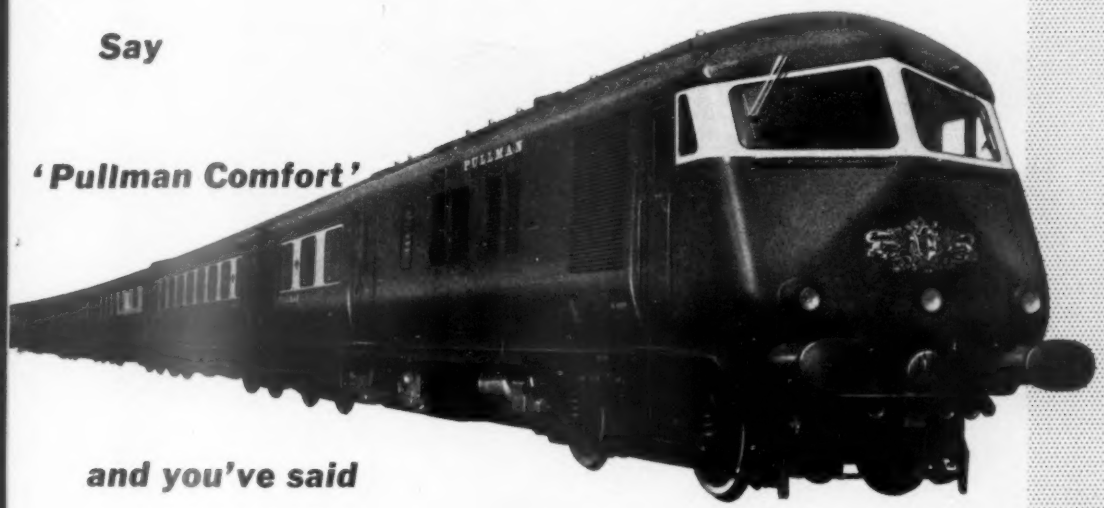
Say

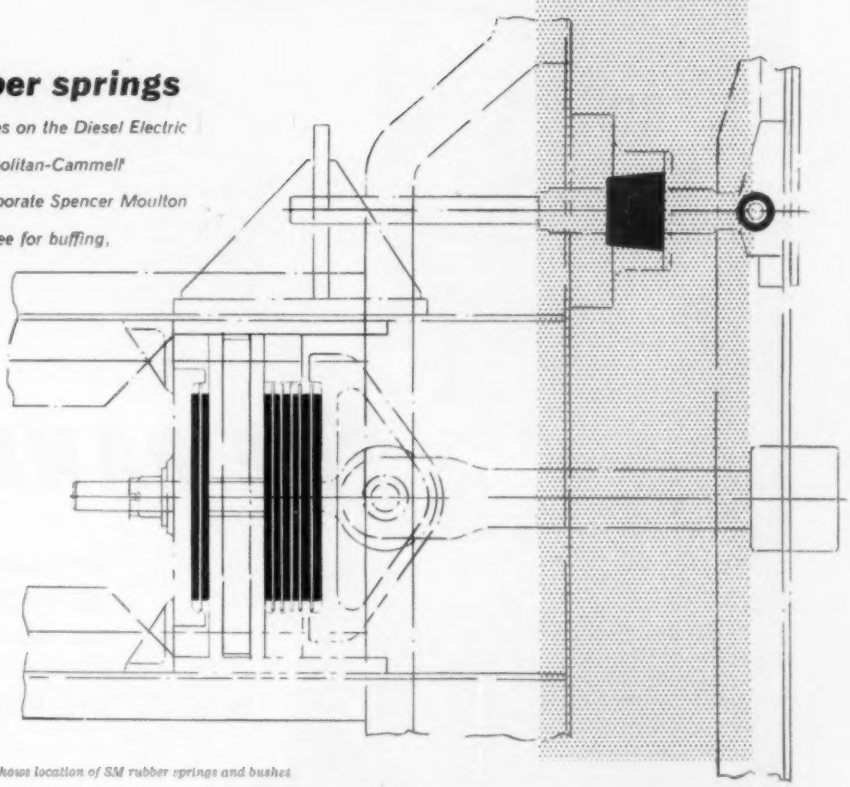
'Pullman Comfort'



and you've said

Spencer Moulton rubber springs

The inter-car buffing and drawgear assemblies on the Diesel Electric Pullman Trains designed and built by Metropolitan-Cammell Carriage and Wagon Company Limited incorporate Spencer Moulton rubber springs; a single unit for traction, three for buffing, providing adequate cushioning for this limited movement multiple unit stock. The vestibule gangway support gear also includes Spencer Moulton tapered rubber bushes in headstock castings, and split outer shell rubber bushes for articulation pins. Here, as in railway stock all over the world, Spencer Moulton rubber reduces noise and vibration, increases comfort, yet requires negligible maintenance.



Layout of buffing and drawgear shows location of SM rubber springs and bushes

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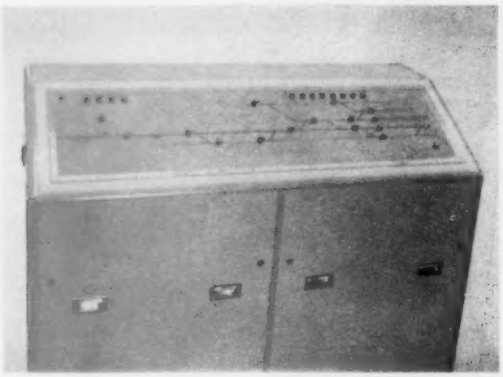

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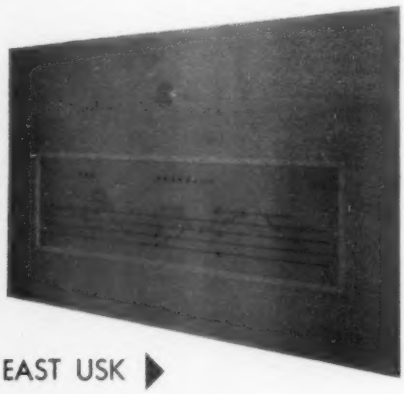

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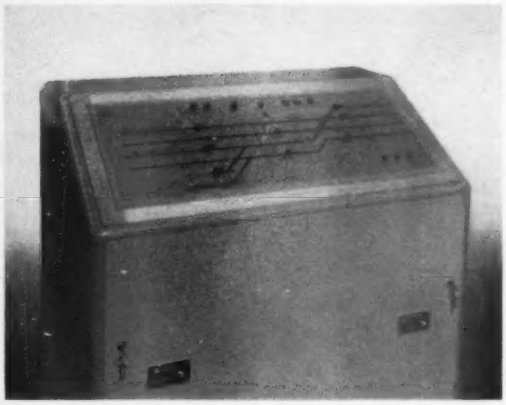

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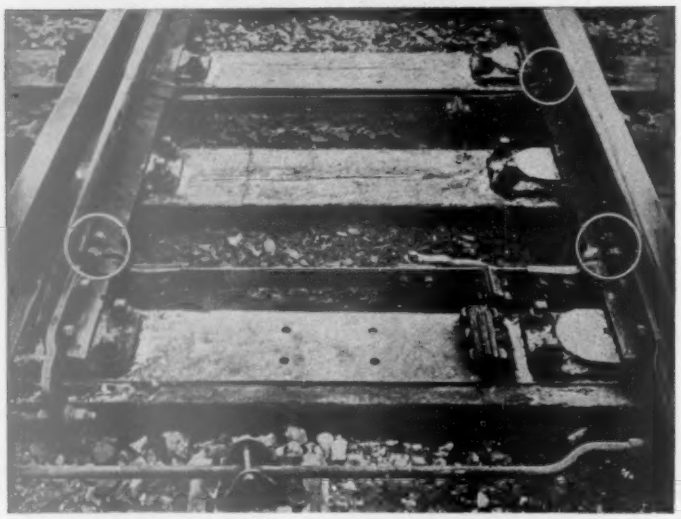

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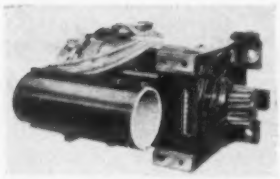
New de luxe Pullmans powered by G.E.C.

Sustained speed . . . consistent performance . . . smooth running . . . all these will be found on the five new British Railways de luxe Diesel-electric Pullman trains designed and built by the Metropolitan-Cammell Carriage & Wagon Co. Ltd., with G.E.C. as the contractors for the principal power equipment.

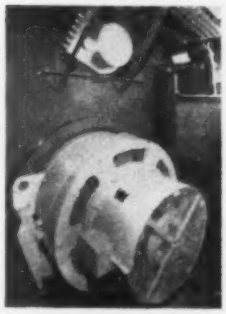
G.E.C. supplied ten complete equipments comprising N.B.L./M.A.N. twelve-cylinder diesel engines direct-coupled to G.E.C. main generators with overhung auxiliary generators, fully spring-borne traction motors, spring drives and control gear—all designed to provide a maximum service speed of 90 mile/h.

The equipment for these five de luxe Diesel-electric Pullmans forms another G.E.C. contribution to the modernization of British Railways.

Driver's Cab



One of the traction motors



Main and auxiliary generator of the main power unit in the power car. The servo-regulator is seen above the generator.

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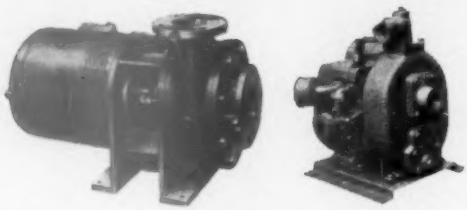

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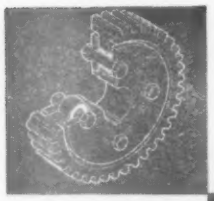

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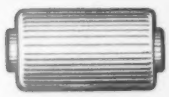

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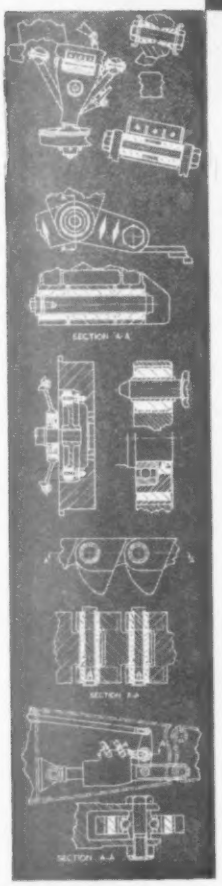

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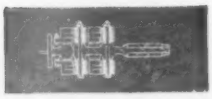

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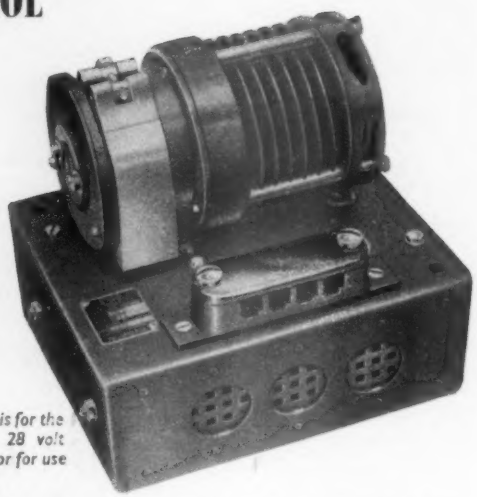

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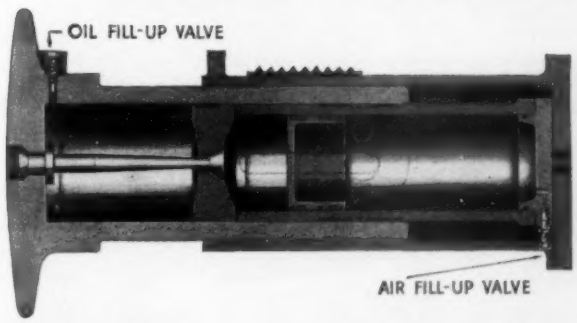

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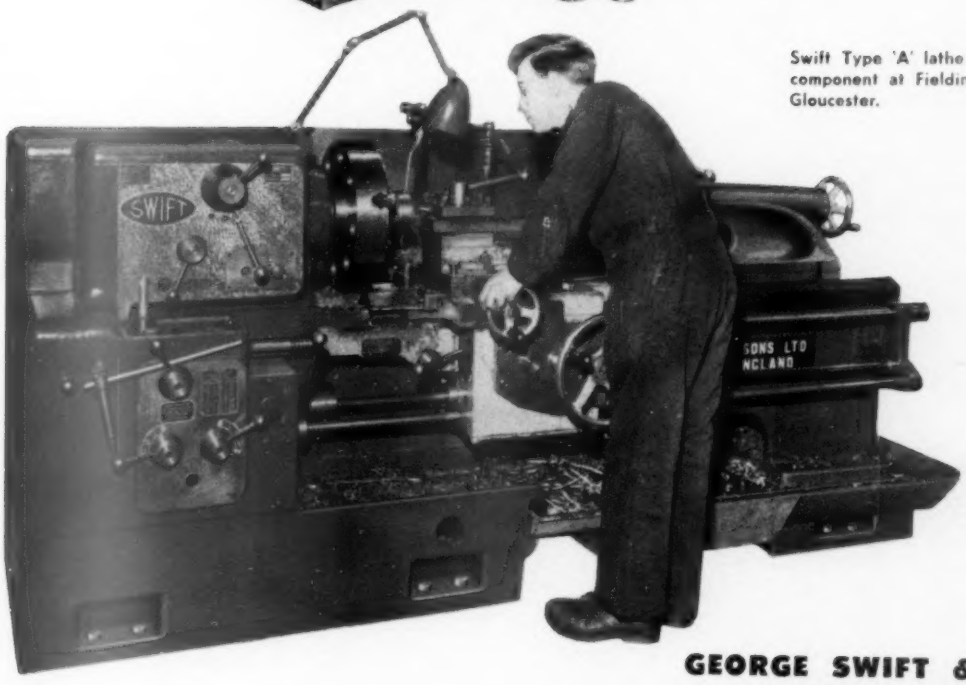

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2

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